the PETROCHEMICALS UNLIMITED

OIL AND GAS JOURNAL

THIS SCULPTOR WEARS A HARD HAT

The HUGHES rock bits you use consistently drill *more hole faster*, because of the "hard hat" experience that goes into their design.

This is the experience of drillers . . . tool-pushers . . . field engineers —duplicated hundreds and, frequently, thousands of times in every drilling area. It is constantly being relayed to Hughes' research and engineering departments by the Hughes field service organization for the better evaluation of bit performance.

When you run a HUGHES bit, you get the benefit of real "hard hat" experience—45 years of it—gained in working directly with the drilling industry.

PRICE 50 CENTS TABLE OF CONTENTS ON PAGE 1 **SEPTEMBER 6, 1954**

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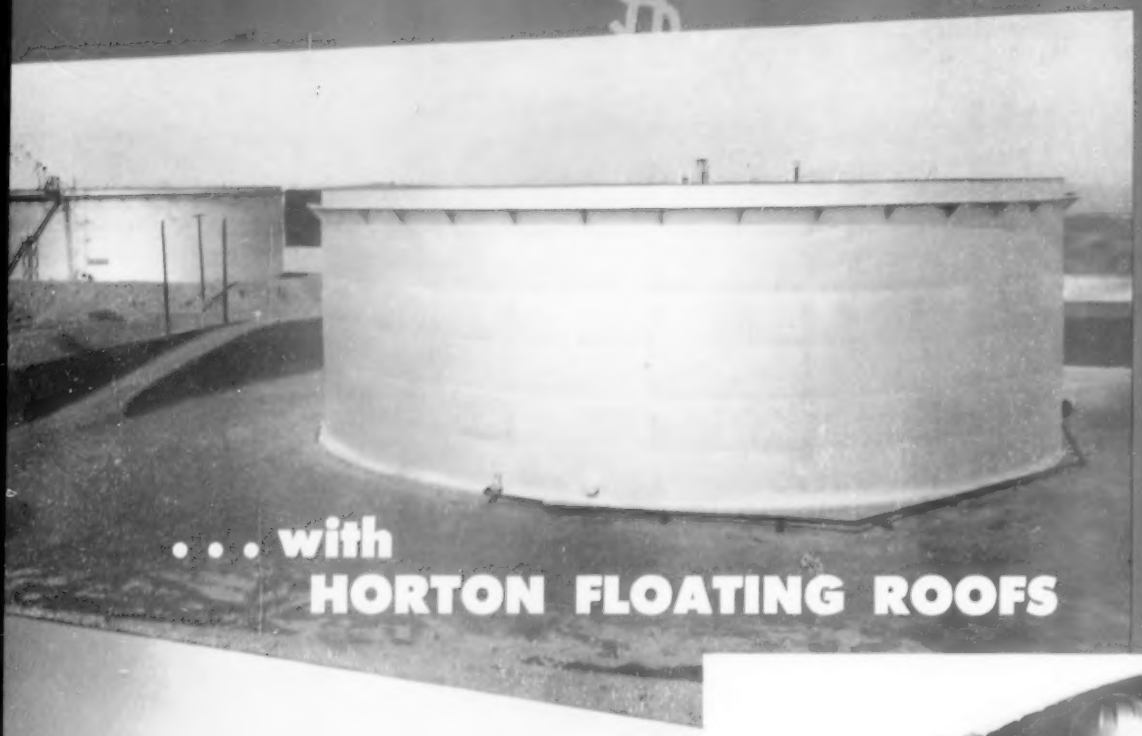

. . . with HORTON FLOATING ROOFS

As stored volatile hydrocarbons evaporate, so do profits. A reduction in evaporation loss is a real saving in money.

Horton® Floating Roofs are installed on tanks storing gasoline and crude oil to reduce evaporation loss, decrease corrosion and eliminate fire hazard. Floating directly on the surface of the liquid in the tank, there is no space above the liquid for air-vapor mixture to form and be vented and lost.

Horton Floating Roofs are built in three types, Double-Deck, Pontoon and Pan. Information, estimates or quotations on any one of the three roofs or any other Horton structure may be obtained by writing our nearest office. There is no obligation on your part.

Rule being held against the sealing ring of a Horton Seal, standard equipment on a Horton Floating Roof, to show its snug fit against the shell of the tank. The Horton Seal closes the space between the deck of the roof and the shell of the tank.

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Boston, 10	1025—201 Devonshire St.	Los Angeles, 17	1523 General Petroleum Bldg.	San Francisco, 4	1554—200 Bush St.
Chicago, 4	2128 McCormick Bldg.	New York, 6	3317—165 Broadway Bldg.	Seattle, 1	1325 Henry Bldg.
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Sociedade Chicbridge de Construcoes Ltda., Av. General Justo 275, Grupo 506, Rio de Janeiro, Brazil
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Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland

the OIL AND GAS JOURNAL

SEPTEMBER 6, 1954 VOL. 53 NO. 18

OIL IN THE NEWS . . .

Esso Completes Conversion of Quarry for Heating-Oil Storage 56
More Companies Protest FPC Order Freezing Gas Sales 58
FPC Decision on Rehearing Order 174 Due This Week 58
Continental Converts Storage Tank to Petrochem Lab 60
Standard of California Celebrates Seventy-Fifth Anniversary 61
Drouth Forces Carter to Use Sewage Water in Illinois Flood 62
Pipe Line Corp., Barge Operators Oppose Little Inch Conversion 63
Standard of Texas Receiving Bids on El Paso-Albuquerque Line 65
Great Lakes Completing Last Segments of Line Extensions 66
World's First Cycling Plant Is Still Going Strong 69
Shell Stakes Location for Its First Texas Tidelands Test 70
Royalite Oil Buys Properties of Hi-Way Refineries, Ltd. 71
Oil and Gas Associations Join Phillips in Court Battle 73
West Australian Petroleum Starts New Exploratory Program 75
India's First Large Refinery Goes On Stream at Bombay 76
Foreign Crude Production Gains as U. S. Output Declines 78
Cuban American Will Spud Wildcat in Cuba's Central Basin 81
Iranian Oil Operations Due to Begin Early in October 82
Caltex Putting On Stream First Refinery in the Philippines 82

NEWS FEATURES . . .

They Say 38
Calendar of Events 45
Journally Speaking 51
Editorial 53
This Week 55
Watching Washington 64
International News 75
Refining News 130
Personals 182
Deaths in the Industry 184
Statistical Summary 186
Drilling Statistics 187
Supply Statistics 188
Refining Statistics 189
Demand Statistics 190

TECHNOLOGY AND OPERATION . . .

[1]Petrochemicals . . . Today and Tomorrow 83
By John C. Reidel
[1]Petrochemical Survey 87
[2]Polyethylene Push 99
[3]New Pipelines Assure Denver-Julesburg Expansion 103
By C. O. Willson
[4]Hydraulic Fracturing 109
By W. E. Hassebroek, Arthur Stegelman, Jr., and S. S. S. Westbrook
On the Job . . . In the Plants 114
Engineering Reference Section 119-127

DEPARTMENTS . . .

Books 119
Equipment Design and Operation 119
Modern Drilling 121
Field Processing 123
Refiners' Notebook 125
Questions on Technology 127
Pipeline Patrol—Construction 133
Equipment Digest 139
Trade Literature 145
Equipment Men in News 152-181
Classified Advertising 191
Advertisers' Index 195

EXPLORATION . . .

Two Dry Basins Are Firing Up 157
Bordeaux Basin Find Stirs French Hopes 158

FIELDS . . .

Drilling Contractors 128
Area Field Reports 159

In Brief . . .

1. PETROCHEM SURVEY . . . The Journal's second Petrochemical Survey, listing plant locations, raw materials, and products, is presented in this issue. Petroleum and natural gas are now the base for some 25 per cent of total chemical production. This percentage may be doubled within the next 10 years. Preliminary U. S. Tariff Commission figures for 1953 indicated 10.8 billion pounds of petrochemical crudes. This includes 8.3 billion pounds of basic aliphatics. Competition between raw materials, processes, and products is a prime characteristic of the chemical industry. In this connection Carbide & Carbon's experimental coal hydrogenation unit and Stanolind's Carthage Hydrocol rehabilitation program are noted. Diversification within the petrochemical field is emphasized with examples such as that of Shell Chemical Corp., producing glycerin and epoxy resins; Continental Oil Co. in synthetic detergents; and Standard Oil Co. of California in aromatics, phenol, and other products.

2. POLYETHYLENE PUSH . . . Perhaps the biggest single expansion in petrochemicals is in polyethylene. A table is presented listing the 11 companies now making this plastic or which have plants under construction. Present manufacture is based on Imperial Chemical Industries' high-pressure (15,000 to 35,000 psi.) process. However, Phillips Chemical Co. is now constructing a semiworks plant for a low-pressure process.

3. DENVER-JULESBURG . . . This basin is one of the most active drilling areas today. Plans, recently confirmed, to build two big-inch crude-oil pipelines with Denver-Julesburg connections, are seen as assuring further large-scale development. Figures are given on development and wildcat drilling from 1949 to date. Fields are listed and crude-oil analyses given.

4. HYDRAULIC FRACTURING . . . Proper choice of the fracturing oil and the propping agent is discussed here. The viscosity, fluid loss, and compatibility with formation fluids are important in choice of fracturing oil. Particle distribution, size, and angularity must be considered in choice of propping agent.

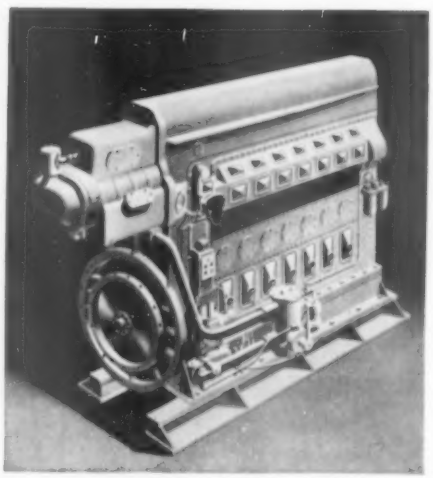
"...who needs O-P?"

Not this bird . . . but he's the only driller that can't cash in on the advantages of the Fairbanks-Morse Opposed-Piston diesels.

O-P was an early bird in the oil fields too . . . in 1938 an F-M Model 38 powered the rig on the deepest well ever drilled by diesel power up to that time. Deeper wells have been drilled, but no other diesel can yet approach the dependability, compactness and economical maintenance record of the 38 O-P.

Proved Opposed-Piston design advantages are available from 320 to 2400 hp. The Model 38F 90 is especially built for continuous heavy-duty oil field service. Its welded steel frame provides maximum resistance to the stresses of transporting and severe shock loadings common to draw works operation, as well as helping to make this engine 20% smaller and lighter than any comparable engine. Opposed-Piston design also contributes to this compactness . . . and gives the added advantage of 40% fewer moving parts. To you, it means fast acceleration and far lower maintenance costs.

Add other O-P advantages—interchangeability of parts . . . three-way fuel options . . . full enclosure of working parts . . . wear-free aluminum bearings—and you've got a power package you can't afford to pass up . . . unless you're a woodpecker! Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Illinois.



Fairbanks-Morse Model 38F 90—320 to 825 hp.

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New Grease Thickener...

Estersil GT

by Du Pont

A new type of grease thickener—quite different from any previously used in commercial grease production—was recently announced by the Petroleum Chemicals Division of the Du Pont Company.

The new material, an estersil, is a pelletized form of finely divided amorphous silica with a "raincoat" chemically attached to each tiny ultimate particle.

Formerly known as PL-171 FINE SILICA, it is completely synthetic and was specially developed for grease compounding. "Built-in" water resistance and exceptional thermal stability are among its unusual and outstanding properties.

NOW—with Estersil GT you can easily prepare a unique multi-purpose grease with the basic advantages listed below . . .

1. Excellent Thermal Stability—Nonmelting Estersil GT greases show little change in consistency over a wide range of operating temperatures.

2. Excellent Shear Stability—This new thickener enables you to make greases with exceptional shear stability under *both* normal and *high* temperature conditions.

3. Water Resistance—The chemically bonded "raincoat" means greases with unusual resistance to wash out or break down in the presence of water.

4. Superior Oxidation Stability—The need for grease antioxidants is eliminated under most service conditions because of the inertness of Estersil GT.

5. Superior Handling Qualities—Softer, more easily applied greases can be used for high temperature service because of the combined mechanical and thermal stability imparted by Estersil GT. These softer greases, of course, are more readily handled at low temperature than the more conventional types.

6. Ease of Manufacture—The completely synthetic preformed thickening structure allows reproducible grease preparation through a simple milling operation.

Du Pont will be glad to send a representative to discuss the formulation of improved greases with Estersil GT. A grease pilot plant is available to assist in this work. Samples of Estersil GT may be obtained by addressing your inquiry to Wilmington, Delaware.

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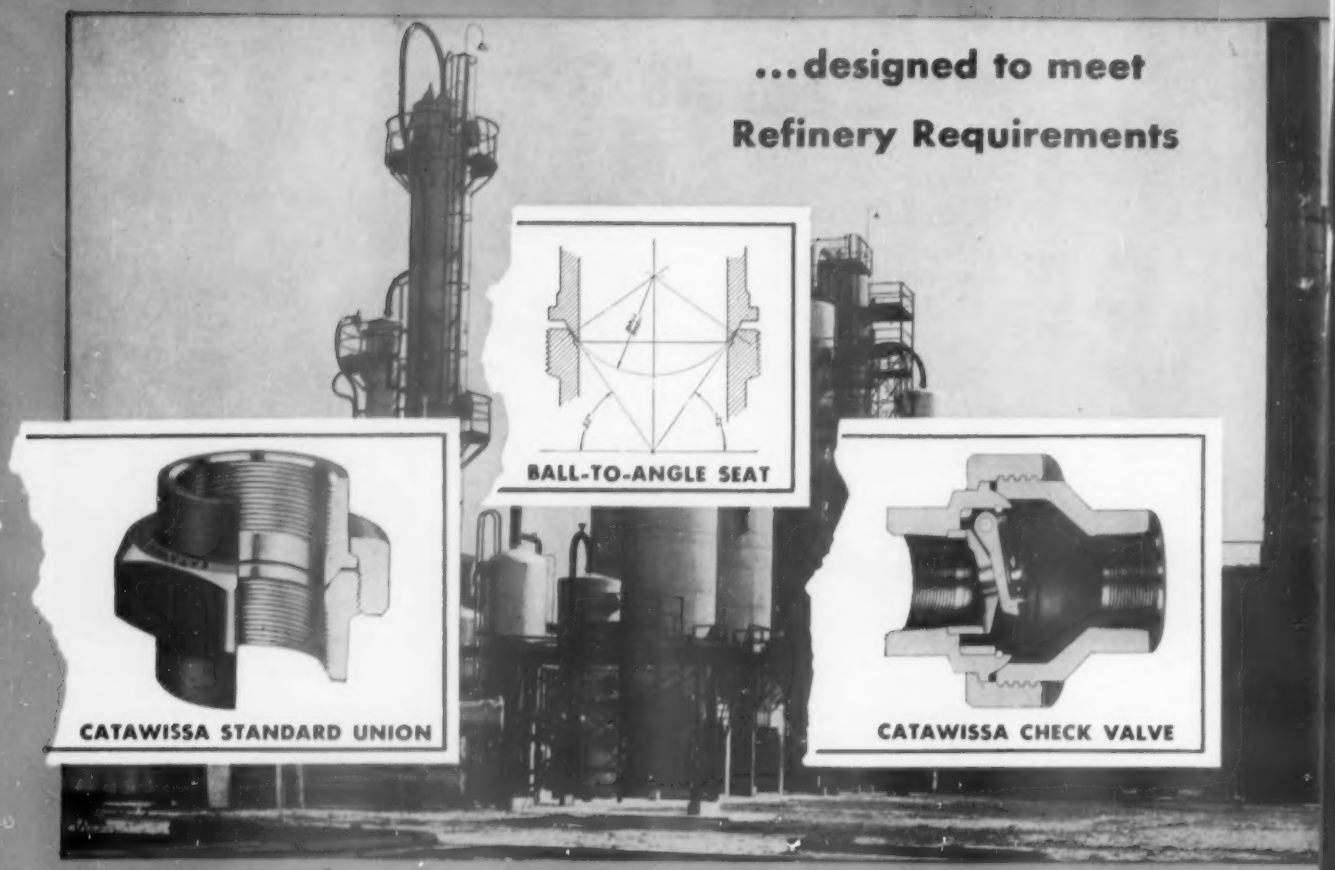
Always specify "CATAWISSA" Unions and Check Valves



"OILWELL'S" strategically located refinery stock points carry complete lines of Catawissa forged-steel unions and check valves that meet the most severe refinery specifications.

CHECK THESE FEATURES

HOT-FORGED . . . from solid, rectangular steel bars, Catawissa Unions are free from sand and blow holes. They will expand and contract with the pipe, assuring tight joints.

THREADS—Catawissa Unions and Valves are supplied with either full ACME threads or U. S. Standard V-threads in the union nuts and on the female end.

SEATS . . . in all Catawissa Unions are a 55° angle on the female end to a BALL on the male end, assuring a perfect seal even when the pipe is not perfectly aligned. Carefully hand-ground seats which require no packing are inspected and tested under water to assure holding qualities.

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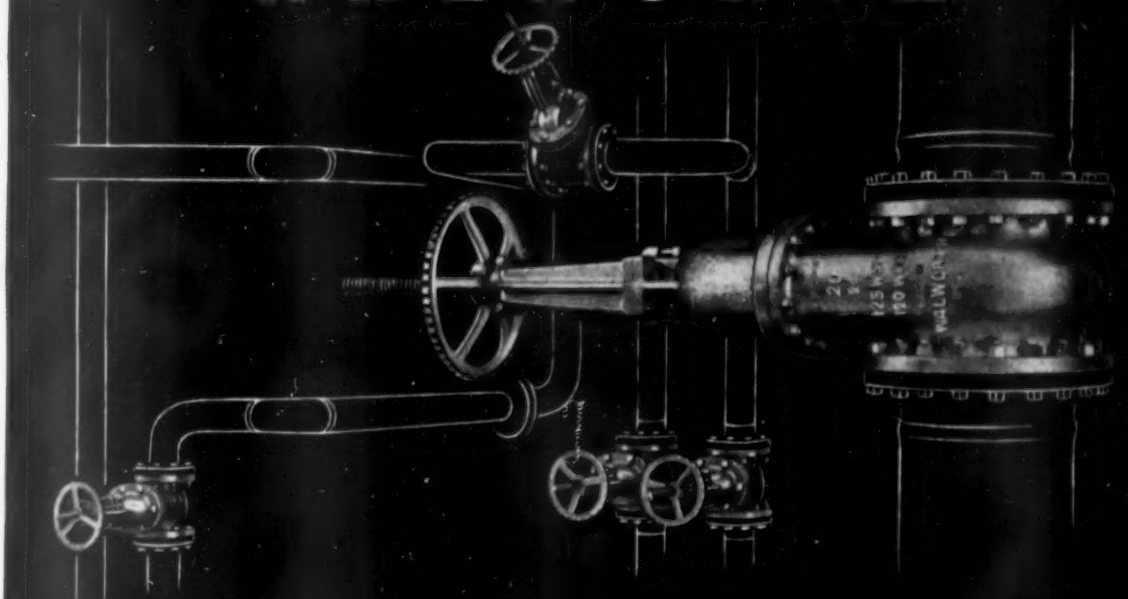
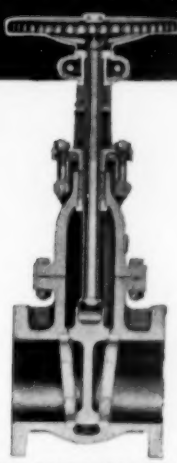


IRON BODY WEDGE GATE VALVES



Walworth No. 726F OS&Y (Outside Screw and Yoke) Iron Body Wedge Gate Valve. OS&Y valves are recommended for services where it is desirable that the line fluid does not come in contact with the stem threads. Note the swing-type gland-eye-bolts for easy repacking. Sizes 2 to 30 inches.

Better because ...**The entire valve, from handwheel to seat rings, is ruggedly constructed to withstand rough and frequent usage. Body, bonnet, and yoke are sturdy castings with large radius fillets. Dimensions and drilling of end flanges are in agreement with American Cast Iron Flange Standards. Stiffening ribs connect end flanges with the body neck to maintain a rigid connection with piping.**

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Whenever you need valves and fittings, choose from complete lines—in a variety of metals—manufactured by Walworth. For more information, see your Walworth Distributor or write: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

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. . . just four or five degrees. But if it is the difference between actual and specified performance of a cooling tower, it is ultra-important. You may spend thousands or hundreds of thousands of dollars for a cooling tower; unless it delivers cold water at the temperature specified for economical operation it will cost more and more thousands in power cost or product recovery.

There is only one sure way to get what you pay for—to purchase a tower that will fulfill your performance specifications under test . . . in your plant. You can only obtain such a tower from a manufacturer whose engineering and research facilities are equal to the task.

Thirty years of research devoted exclusively to water cooling and a complete test plant enable Marley's cooling tower engineering staff (largest in the world) to predetermine tower performance scientifically and to verify it by actual test. That is why Marley not only invites but *urges* every customer to test his tower by any accepted test standard. Marley knows and positively guarantees that every tower it offers today will meet or exceed performance specification.

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MARLEY

*In addition to carbon steel and stainless steel**

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WELDING FITTINGS

may be had in

- **WROUGHT IRON**
- **ALUMINUM**
- **INCONEL**
- **PURE NICKEL & MONEL**
- **COPPER (Deoxidized)**
- **HASTELLOY ALLOYS, B & C**

Piping engineers can choose Grinnell Welding Fittings today from numerous materials having exceptional resistance to heat and cold, as well as the ability to cope successfully with troublesome fluids and gases.

Numbered among these are intermediate and high alloy steels containing chromium, nickel (or both)—plus other alloying elements such as molybdenum and copper. In addition, alloys are available which are composed primarily of nickel, copper or aluminum. Hastelloy Alloys B & C, developed primarily for severe chemical service, are also available.

Charted on this page are Grinnell Welding Fittings in a variety of materials and sizes.

**Covered in previous advertisements. Available on request.*

TYPE OF FITTING (All dimensions in inches)		WROUGHT IRON		ALUMINUM[1] Type 3S-F		INCONEL			NICKEL & MONEL			COPPER[2] Deoxidized		HASTELLOY ALLOYS B & C		
		Std. Wall	Ex. Str. Wall	Std. Wall	Ex. Str. Wall	Sch. 10	Std. Wall	Ex. Str. Wall	Sch. 10	Std. Wall	Ex. Str. Wall	Std. Wall	Ex. Str. Wall	Schedule 5	Schedule 10	Std. Wall
ELBOWS	90° Long Radius	½-12	½-12	½-16	½-16	½-12	½-12	½-12	½-12	½-12	½-12	½-24	½-24	½-8	½-8	½-8
	90° Short Radius	....	....	1-16	1½-16	....	....	....	....	....	....	....	....	....	....	....
	45° Long Radius	½-12	½-12	½-16	½-16	½-12	½-12	½-12	½-12	½-12	½-12	½-24	½-24	½-8	½-8	½-8
RETURNS	180° Long Radius	....	....	½-16	½-16	½-12	½-12	½-12	½-12	½-12	½-12	½-24	½-24	....	....	....
	180° Short Radius	....	....	1-16	1½-16	....	....	....	....	....	....	....	....	....	....	....
TEES	Straight Outlet	½-12	½-12	½-16	½-16	½-12	½-12	½-12	½-12	½-12	½-12	½-16	½-16	½ & larger	½ & larger	½ & larger
	Reducing Outlet	½-12	½-12	½-16	½-16	½-12	¾-12	¾-12	½-12	¾-12	¾-12	¾-16	¾-16	½ & larger	½ & larger	½ & larger
CROSSES	Straight Outlet	....	....	½-12	½-12	....	....	....	....	....	....	....	....	....	....	....
	Reducing Outlet	....	....	½-12	½-12	....	....	....	....	....	....	....	....	....	....	....
REDUCERS	Concentric	1-12	1-12	½-16	½-16	¾-12	¾-12	¾-12	¾-12	¾-12	¾-12	¾-12	¾-12	½ & larger	½ & larger	½ & larger
	Eccentric	1-12	1-12	½-16	½-16	¾-12	¾-12	¾-12	¾-12	¾-12	¾-12	¾-12	¾-12	½ & larger	½ & larger	½ & larger
STUB ENDS	ASA Length	½-12	½-12	½-24	½-24	½12-	½-12	½-12	½-12	½-12	½-12	½-12	½-24	½ & larger	½ & larger	½ & larger
	Short Length	....	....	....	....	½-12	½-12	½-12	½-12	½-12	½-12	....	....	½ & larger	½ & larger	½ & larger
CAPS		¾-12	¾-12	½-24	½-24	½-12	½-12	½-12	½-12	½-12	½-12	½-24	½-24	½ & larger	½ & larger	½ & larger

1. Type 2S-F Alclad, 3S-F, and Type 61S-T6 also available.

2. Red brass, low silicon bronze, admiralty metal, aluminum bronze and other copper alloys available on request.

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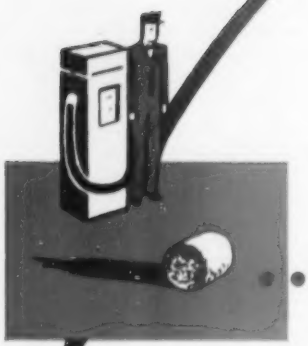

..it's the catalyst that counts!

The Davison Chemical Corporation has teamed with The Atlantic Refining Company in the development of a catalyst for reforming straight run and cracked gasolines to a product of higher octane level. Among the important tasks delegated to Davison was the translation of this catalyst from laboratory to commercial production and at the same time impart optimum selectivity, stability, ruggedness and regenerability.

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Amercoat pioneered the development of protective coatings especially designed for severe corrosion problems. Today it is the only organization that offers you... a complete line of corrosion resistant coatings...nationwide distribution... trained technical men to give you on-the-job assistance throughout the United States and Canada.

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Extra stability of truck mounting almost doubles the load capacity of this Koehring heavy-duty 304 — substantially increases work range of clamshell, dragline and lift crane operation. It safely lifts up to 25 tons on rubber. That's an increase of 11.1 tons over its crawler rating. Boom length steps up from 75 to 110 feet maximum, with jib.

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Remember, too, convertibility to pile-driver, ¾-yard shovel or hoe extends the 304's speed, mobility and big work capacity to all oil field excavating, lifting and material-handling jobs. With every attachment, Koehring 304 booster clutch reduces normal lever pull 50%. Yet, it retains accurate "feel" of load — is self-adjusting, maintains full operating efficiency at all times.

Get the complete story from your Koehring distributor — or send for new 304 catalog. Other Koehring heavy-duty sizes: ½ to 2½ yards — crane capacities up to 79½ tons.

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NEW Operating Efficiency—Added wing area, wing span; new jet-type exhaust stacks; new landing angle; improved pilot's visibility; *plus* other improvements.

NEW Entrance—Larger cabin door lets down to provide an easy stairway for quicker, safer entrance-exit.

NEW Cabin—A higher ceiling and a greater inside usable length provide greater walk-around cabin roominess. An attractive new accordian-type door between cabin and pilot's compartment allows variety of unimpeded seating arrangements.

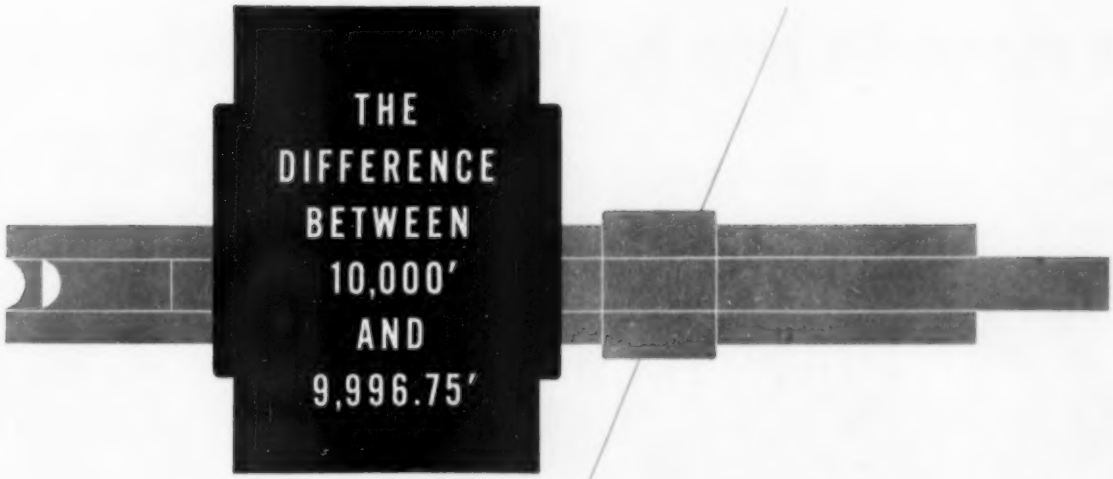
NEW Interiors—New chairs styled for increased comfort, *plus* the ultimate of styling of interior features.

NEW Windows—Additional and much larger cabin windows provide an improved view for all passengers.

NEW Rear Compartment includes a new rest room with privacy and spaciousness, a built-in luggage rack.

For full details on *the NEW Super 18 Beechcraft,* see your Beechcraft distributor, or write to Beech Aircraft, Wichita, Kansas. More than a thousand postwar Model 18 "Twins" have helped earn recognition that *Beechcrafts are the Air Fleet of American Business.*

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS



IS HALLIBURTON'S MEASURING EQUIPMENT SERVICE

Measuring equipment that once met rigid standards for accuracy may now be recording "close guesses" because of minute variations from original construction. The slight change of .01" in the diameter of a sheave groove will cause an error of 3.25′ in a 10,000′ hole. But a Halliburton Measuring Device, originally constructed to record 10,000′ at exactly that point in your well, can be easily maintained to give years of just-built accuracy.

A thorough inspection of all your measuring equipment by a trained Halliburton operator will quickly determine if wear on the sheave, pressure wheels, Veeder Counter or even head bolts is causing "close guesses" instead of precise accuracy. And making corrections of any accuracy-damaging conditions is surprisingly simple.

Your nearby Halliburton operator has the training, equipment and experience needed to qualify as a specialist in measuring equipment service. His interest in your equipment extends many years beyond original purchase because he knows that regular inspections and service are the best ways to maintain the Halliburton standard of accuracy.

Stocks of replacement parts *in the field* make it easier for the operator to give you better service, faster. Halliburton's complete field warehousing system provides minutes-away service on all measuring equipment parts—except for the largest piece of equipment, such as complete powering unit. And a full inventory of these units is maintained to prevent any unnecessary delay.

And there's one more important point. Halliburton, who originated measuring equipment for the oil fields, has consistently been the leader for thirty years. That in itself best explains why Halliburton knows more about measuring equipment than anyone else—is best qualified to handle all your service needs.

Call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.

HALLIBURTON

CEMENTING EQUIPMENT

THERE'S NO SUBSTITUTE FOR EXPERIENCE IN OIL WELL CEMENTING

An unbeatable team for temperature measurement

DYNALOG RECORDERS and DYNATHERM BULBS

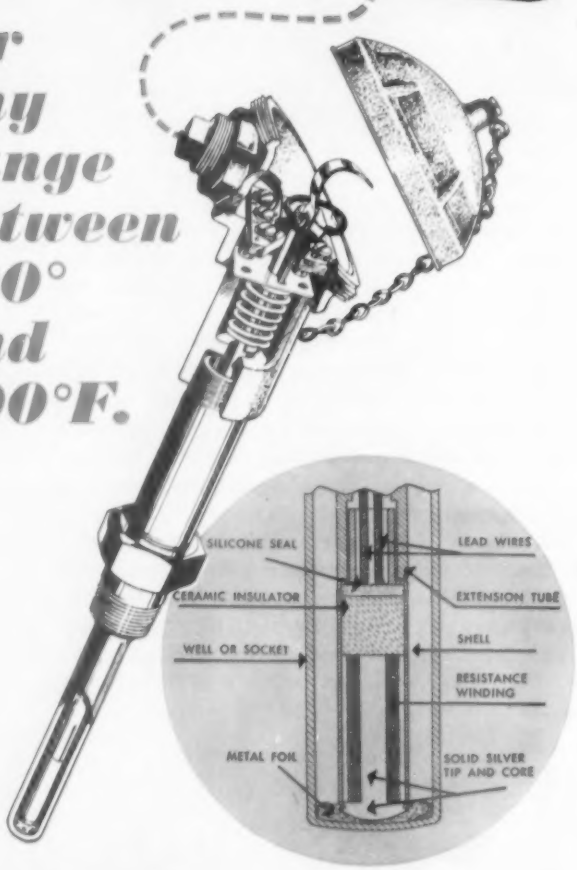
You can't beat this Foxboro Dynalog-Dynatherm combination for insuring better temperature measurement on any job between–100° and+600°F. It gives you every advantage of speed, accuracy, long leads, simple installation, economy, and freedom from maintenance. This is why:

The Dynalog Electronic Recorder has an exclusive variable-capacitor measuring system which eliminates slidewires, gears, cables, high speed balancing motors . . . no dead space, no batteries to standardize, no motors to service. Standard full-scale pen speed only 3 seconds. Sustained accuracy ¼ of 1% guaranteed. Available for spans as narrow as 5°F. with full-accuracy calibration.

The Dynatherm Resistance Bulb has unique features including metal-to-metal end-contact which, when installed in a well or socket, gives a speed of response unsurpassed by any other similarly protected temperature-sensitive element. Exceptionally rugged and permanent in calibration.

These are only a few of the important advantages of this better temperature measuring system . . . available also for control of temperatures, or with Multi-Record Dynalog Recorder for up-to-6 records on one chart. Write for illustrated bulletins, The Foxboro Company, 609 Neponset Ave., Foxboro, Mass., U.S.A.

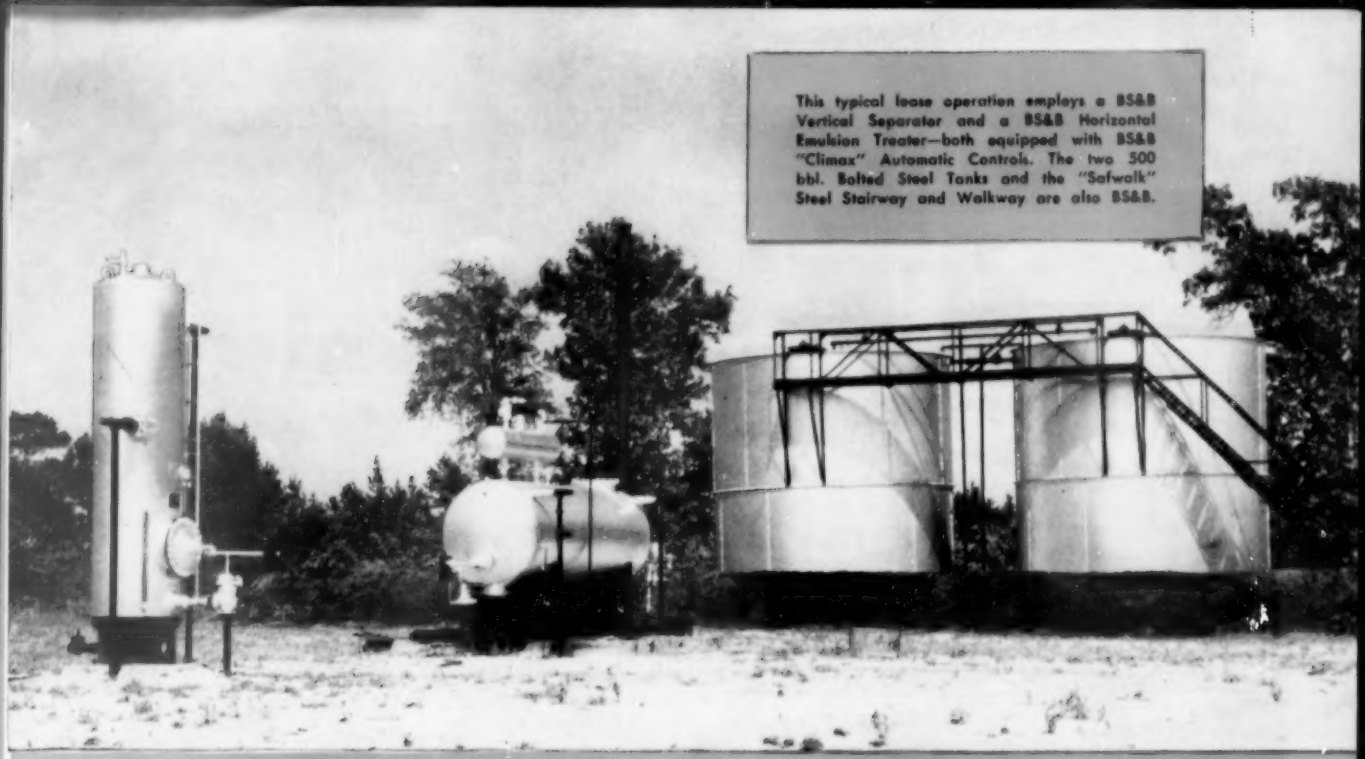
for any range between -100° and +600°F.



FOXBORO INSTRUMENTATION

REG. U.S. PAT. OFF.

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND



This typical lease operation employs a BS&B Vertical Separator and a BS&B Horizontal Emulsion Treater—both equipped with BS&B "Climax" Automatic Controls. The two 500 bbl. Bolted Steel Tanks and the "Safwalk" Steel Stairway and Walkway are also BS&B.

For Faster Payout, Greater Profits And A More Efficient Operation...

...Equip Your Lease 100% BS&B!

For more than six decades—almost as long as there has been an oil industry—BS&B has enjoyed a position of leadership in the manufacture of quality oilfield production equipment.

This leadership has been born of our never-ending effort to improve on the "established" ways of doing things, and of our continuing program of engineering research, pioneering and the development of equipment which out-performs all others—with faster payout and greater profit for you!

Next time you put a lease on production, why not do as many other profit-wise operators are doing these days—equip your lease 100% BS&B!

BS&B Offers A Complete Line of Oilfield Production Equipment!

Bolted Steel Tanks . . . Welded Steel Tanks . . . Wood Tanks . . . Oil and Gas Separators . . . Free Water Knock-outs . . . "COLD-FRAC" Low Temperature Separation Units . . . Stabilizers . . . Heaters . . . Emulsion Treaters . . . Gas Dehydrators . . . Gas Desulfurizers . . . Chemical Feeders . . . "CLIMAX" Automatic Control Equipment . . . Walkways and Stairways . . . Safety Heads . . . Special Fabrication.

EFFICIENCY OVER 60 YEARS BS&B RELIABILITY

For detailed information, consult your BS&B Representative—or write to us direct.

BLACK, SIVALLS & BRYSON, INC.

Oil & Gas Equipment Division, Dept. 1-A9

1708 West Main Street Oklahoma City, Oklahoma

"...here's my NEW warehouse at Newcastle, Wyoming!"

D. H. CARSON
District Sales Manager

R. R. BROWN
Local Store Manager

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Salesman

L. L. REED
Salesman

E. H. HENDRICKS
Storeman

G. R. CAIN
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Storeman

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DISTRICT OFFICE
Denver, Colorado

STORES
Casper, Wyoming
Rangely, Colorado
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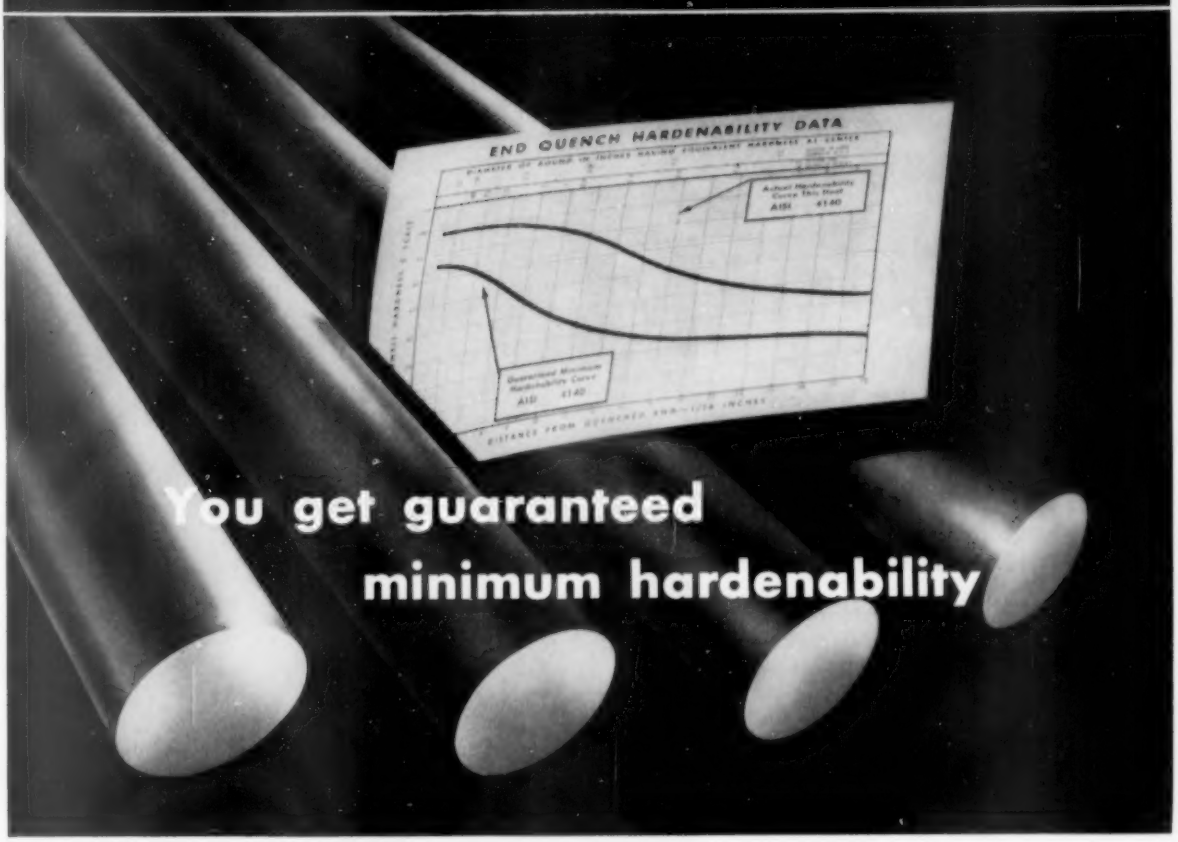
STEEL CORPORATION
SUPPLY DIVISION—TULSA, OKLAHOMA
Serving The United States and Canada

P·E·S·A
PARTNERS IN PETROLEUM PROGRESS

WHY IT PAYS TO BUY ALLOY STEELS FROM US



• You *know* what you're getting when you buy alloy steels from U. S. Steel Supply. For with each lot you purchase, we furnish a personalized data card. This card charts the guaranteed minimum hardenability and gives analysis information and recommended tempering and working temperatures. You are thus assured of getting in full measure the tensile strength, fatigue resistance, ductility and toughness that your design requires. We can assure maximum machinability too, for we adhere to unusually strict metallurgical standards in the purchase of all our alloys.

Have you ever seriously considered how alloy steels might contribute to your production of a better product at a cost that might be even lower than at present? If not, it will pay you to call U. S. Steel Supply. One of our salesmen will gladly study your specific problems and, if alloy steel will do a better job for you, he will recommend the best alloy and see that you get it promptly.

Call us for: USS Carilloy alloy steels—hot rolled rounds, cold finished rounds, squares, hexagons, "FC" (Free-Cutting) rounds; USS Carilloy Aircraft Quality hot rolled rounds and flats and cold finished rounds, squares, hexagons, flats.

TRIPLE SECURITY

What you want
When you want it
At the right price

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DIVISION

General Offices
208 So. La Salle St., Chicago 4, Ill.

USS

Warehouses and Sales Offices
Coast to Coast

USS STEEL
UNITED STATES STEEL

UNITED STATES STEEL

Case No. 64

Kemp Dryer Assures Accuracy For Sun Oil Co.

How SUNOCO guarantees dependable instrument readings 24 hours a day

WHEN the Sunoco Plant at Marcus Hook, Pa., introduced a new process at the beginning of the year, many new instruments were installed. To dry the compressed air operating these instruments and assure accurate readings, Sunoco installed a Kemp Model 300 S Dryer.

Kemp Dryer Entirely Satisfactory

According to Harold Powers, Instrument Supervisor at Sunoco, the Kemp Dryer has been entirely satisfactory in performance. Operating continuously day and night since installation, it has performed according to specifications, has never been saturated, and has required very little attention.

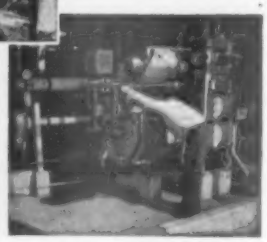
Kemp Dryers for Every Purpose

Kemp offers a variety of dryer models to meet all problems. Designed to dry air to sub-zero dew points at low cost, they are constructed of quality materials and embody the engineering knowledge gained from Kemp's many years of experience. They are available with manual, semi-automatic, or fully automatic tower reactivation. In addition, Kemp will prescribe the proper desiccant for each specific drying job. If you have a problem involving the removal of water from air, gases, or liquids, contact Kemp engineers now.

KEMP INERT GAS GENERATORS, too, serve Sunoco well

Sunoco reports that its two Kemp Inert Gas Generators have given highly satisfactory service. They are easy to start, and then operate automatically, requiring little attention. Both deliver high volume of gas of the proper analysis regardless of demand.

Kemp Inert Gas Generator Model C-5 MIHE. Delivers N_2 and CO_2 used to blanket top of wax tank.



Kemp Inert Gas Generator Model 8 MIHE. Produces N_2 and CO_2 for blanketing and for bubbler systems. Located in the open.

For more complete facts and technical information, write for Bulletin D-27 to:
THE C. M. KEMP MFG. CO., 405 East Oliver Street, Baltimore 2, Md.

KEMP OF BALTIMORE

DYNAMIC DRYERS

CARBURETORS • BURNERS • FIRE CHECKS
METAL MELTING UNITS • INERT GAS GENERATORS
SINGEING EQUIPMENT

Put VERSATILITY into Your Drilling Picture

To brighten your drilling picture, investigate the extra profit possibilities of Bucyrus-Erie spudders. Their ability to handle a wide variety of tough jobs with outstanding speed and economy means extra profits for you.

TOP-TO-BOTTOM DRILLING For drilling from grass roots to pay in all kinds of formations, Bucyrus-Eries are efficient, smooth-running machines. They combine big capacity with a sharp powerful spudding action for fast hole production with no loss-of-circulation worries.

WELL COMPLETION Bucyrus-Erie spudders are ideal for drilling-in. Highly mobile and easy to set up, they can move in on the job and get busy as soon as the rotaries move off. With either sturdy semi-trailer mounting or easy-sliding skid base, these modern rigs save valuable hours of moving time.

SERVICING JOBS Whether the work is tube-and-rod servicing, cleaning-out, swabbing, or deepening, Bucyrus-Eries handle it in exceptional time. Fast powerfull line pulls and accurate control mean easy handling of tools, bailer, casing or rods. All models can operate with their own telescoping derricks or under stationary derricks.

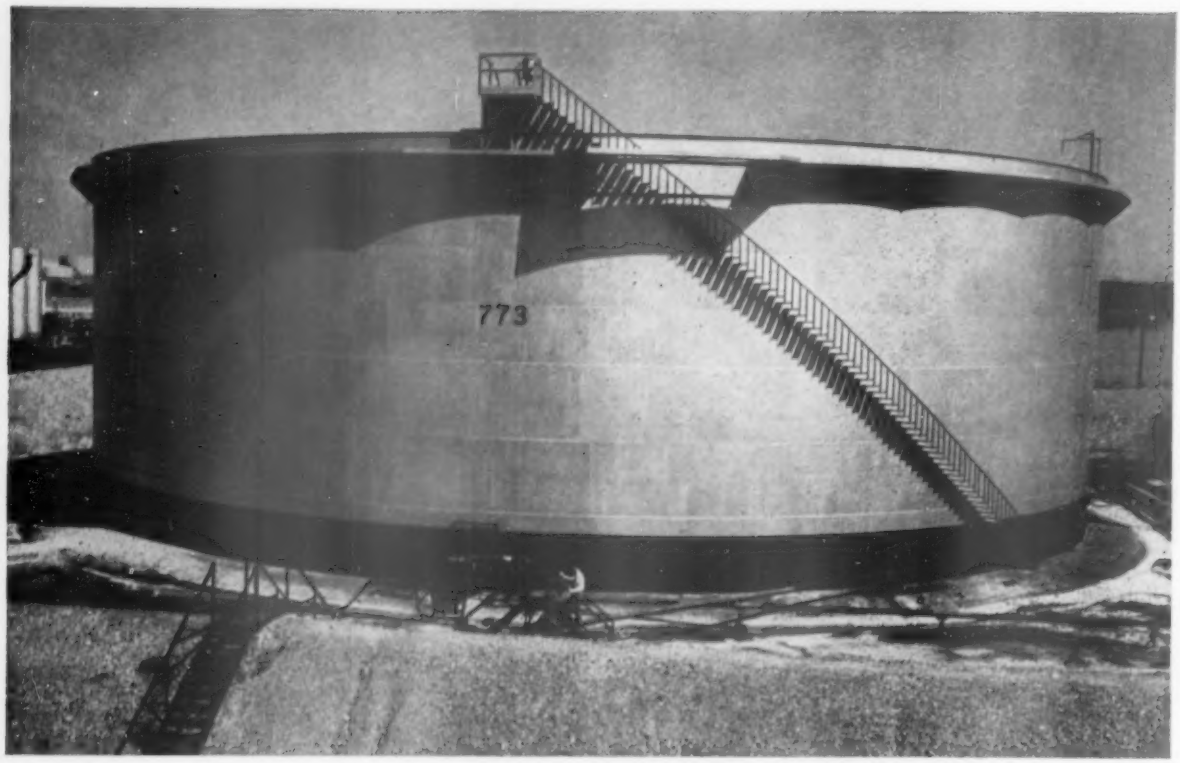
11554C

Get the full story on these all-round units from your nearby Bucyrus-Erie spudder distributor. Four models: 60-L, 28-L, 36-L, 48-L. Maximum drilling depth, 6000 feet; servicing 7000 feet.

BUCYRUS ERIE

South Milwaukee, Wisconsin

• *First with the Finest in Spudders* •



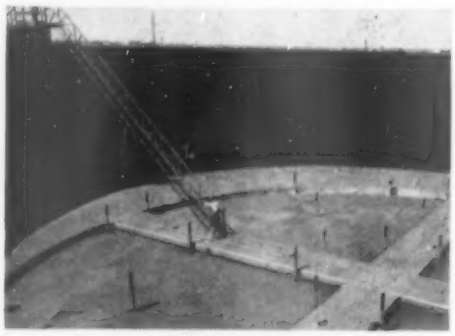
One of Three Bethlehem Floating-Roof Tanks at California Oil's Perth Amboy Refinery

The white-shirted man in the foreground gives you an idea of how big this tank is. It stands 48 ft high, is 150 ft in diameter, and holds 150,000 barrels of crude oil or refined products.

The California Oil Company recently installed three of these pontoon-type floating-roof tanks at its Perth Amboy, New Jersey, refinery on Arthur Kill. California gets double duty from these big tanks. First, they use them to store crude oil brought in by tanker. Heating coils, built right into the tanks, keep the crude from getting too sluggish in chilly weather. Second, they use them to store light refined products —a job that these tanks are ideally suited for because of their floating-roof design.

As shown in the photo at the right, these tanks have annular and radial pontoons, which form a large portion of the roof area, providing great buoyancy and insulating the contents from the heat of the sun. Yet they are surprisingly economical to build.

Perhaps you'd like further information. A letter or phone call to the nearest Bethlehem sales office will promptly bring you full details about Bethlehem storage tanks.



The unique radial pontoons shown here retain the proper roof slope to the center for drainage, and provide convenient walkways for maintenance and inspection.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast **Bethlehem** products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STORAGE TANKS

BETHLEHEM DESIGNS AND BUILDS CONE-ROOF TANKS • DOME-ROOF TANKS
UMBRELLA-ROOF TANKS • LIFTER-ROOF TANKS • FLOATING-ROOF TANKS
PRESSURE VESSELS • GAS HOLDERS • PROPANE TANKS

BETHLEHEM STEEL

Now, for your convenience the NAME of each GRADE of Aerocat Fluid Cracking Catalyst indicates its PDI

* **Particle Distribution Index**
Key to Catalyst Efficiency

These three new grades of AEROCAT Fluid Cracking Catalyst, each identified by its PDI (the amount of catalyst in the 30-80 micron range), cover all fluid cracking unit requirements:

Aerocat 50/60 (Light) — for fluid units with low linear gas velocities, adequate dust disengaging space, excellent cyclone and Cottrell efficiency, low bed density needs.

Aerocat 60/70 (Intermediate) — for fluid units with moderate to high linear gas velocities, adequate catalyst recovery.

Aerocat 75/85 (Narrow) — for fluid units with high linear gas velocities, moderate disengaging space, limited recovery equipment.

Technical Data Sheet — "AEROCAT — Particle Size Distribution" — available on request.

As the result of a survey of the industry's cracking catalyst needs, Cyanamid has recently made available three new grades of AEROCAT fluid catalysts. Particle size distribution of each grade has been designed to offer optimum catalyst utilization under the entire range of existing fluid unit operating conditions.

Because of the importance of Particle Distribution Index in selecting the correct catalyst, we have gone a step further for your convenience. We have indicated the PDI in the *name* of each of these three grades of AEROCAT, as shown in the box.

For details, send for a new technical data sheet on the Particle Size Distribution of AEROCAT or discuss the subject with your Cyanamid Representative.

The convenience offered by this grading system is only one among many reasons why *8 out of 10 users of synthetic catalyst prefer* AEROCAT — and Cyanamid's service.

They also find AEROCAT the surest, most economical means for securing

- high octane yields
- high throughput
- low CO_2/CO ratio in flue gas
- high isobutane yield
- excellent heat, steam, sulfur stability

Aerocat® Fluid Cracking Catalyst

AMERICAN Cyanamid COMPANY
REFINERY CHEMICALS DEPARTMENT
30 Rockefeller Plaza, New York 20, N. Y.

In Canada: North American Cyanamid Limited, Toronto and Montreal

Argon gas being used as a backing agent replacing backing rings . . . Welding operations are fast and simple.

ELIMINATE Backing Rings

in Stainless Steel Piping with HELIARC Welding

Trade-Mark

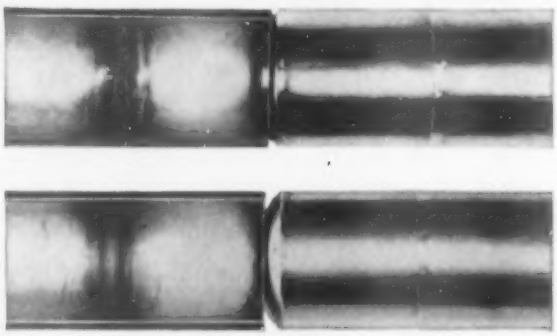
The combination of stainless steel pipe and HELIARC welding with argon gas backing produces a corrosion-resistant piping system—ideal for handling foods, fluid metals, corrosive liquids, high-pressure and high-temperature steam, and pharmaceutical products.

No backing rings—argon replaces the atmosphere in the section of pipe to be welded, and protects the weld bead from the underside as it is formed. This eliminates the need for metal backing rings.

New torch techniques allow the operator to control the size and shape of the penetration bead inside the pipe, while he is making the weld.

Smooth, sound joints—every time. HELIARC welding produces joints free from obstructions, notches, and crevices which hinder or trap flowing materials within the piping system. The penetration bead in the pipe is held within 1/32-in. of the pipe's normal inside diameter.

For the full story on argon-backed, stainless steel pipe fabrication, ask your local LINDE representative for the booklet, "Inert-Tungsten Arc Welding of Stainless Steel Piping," F-8463. In addition, he will be glad to give you complete information on how HELIARC welding cuts time and cost in many other applications. Start saving now—call him today.



Top—interior and exterior of completed welds without argon backing. Bottom—with argon backing, note the smooth, porosity-free, high quality welds.

Linde Air Products Company

A Division of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N. Y.

Offices in Other Principal Cities

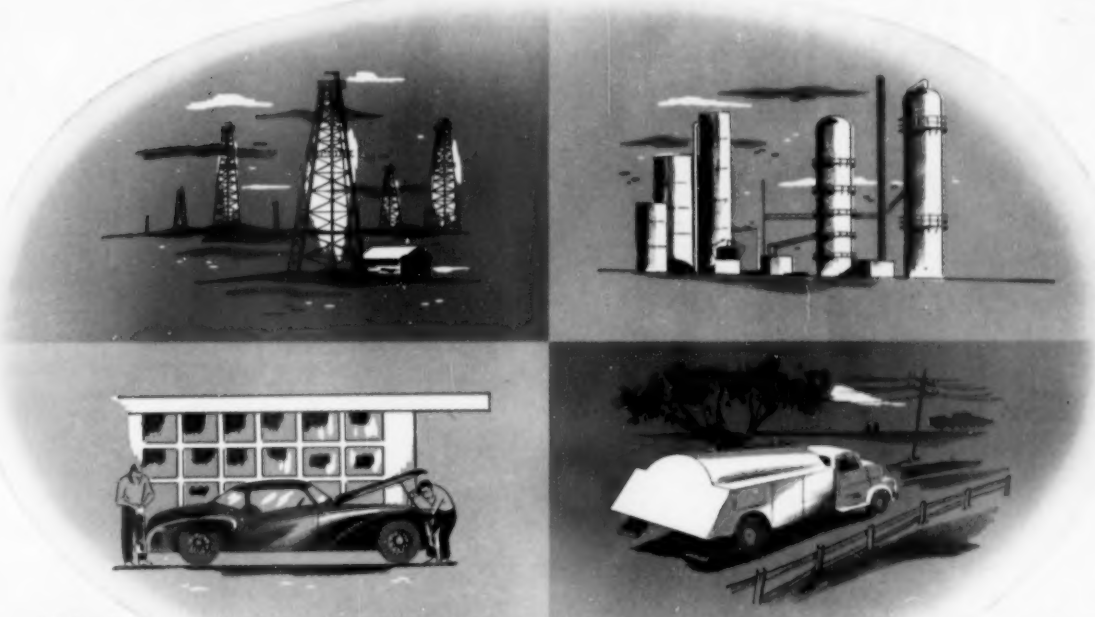
In Canada: DOMINION OXYGEN COMPANY

Division of Union Carbide Canada Limited, Toronto

Linde Trade-Mark

"Heliarc" and "Linde" are registered trade-marks of Union Carbide and Carbon Corporation.

the bright coat that protects Petroleum Installations everywhere



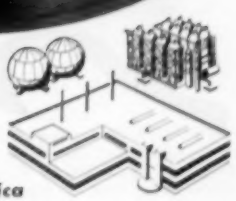
"Liquid Aluminum"

Liquid Aluminum will protect and brighten petroleum industry buildings and equipment from rig to retail. It protects against ruinous rust and also against corrosion from smoke and fumes. Its high reflectivity decreases evaporation losses. Its bright, sparkling appearance makes building interiors and exteriors more attractive . . . more sales-inviting. Put *Liquid Aluminum* to work for you and watch it cut maintenance and replacement costs!

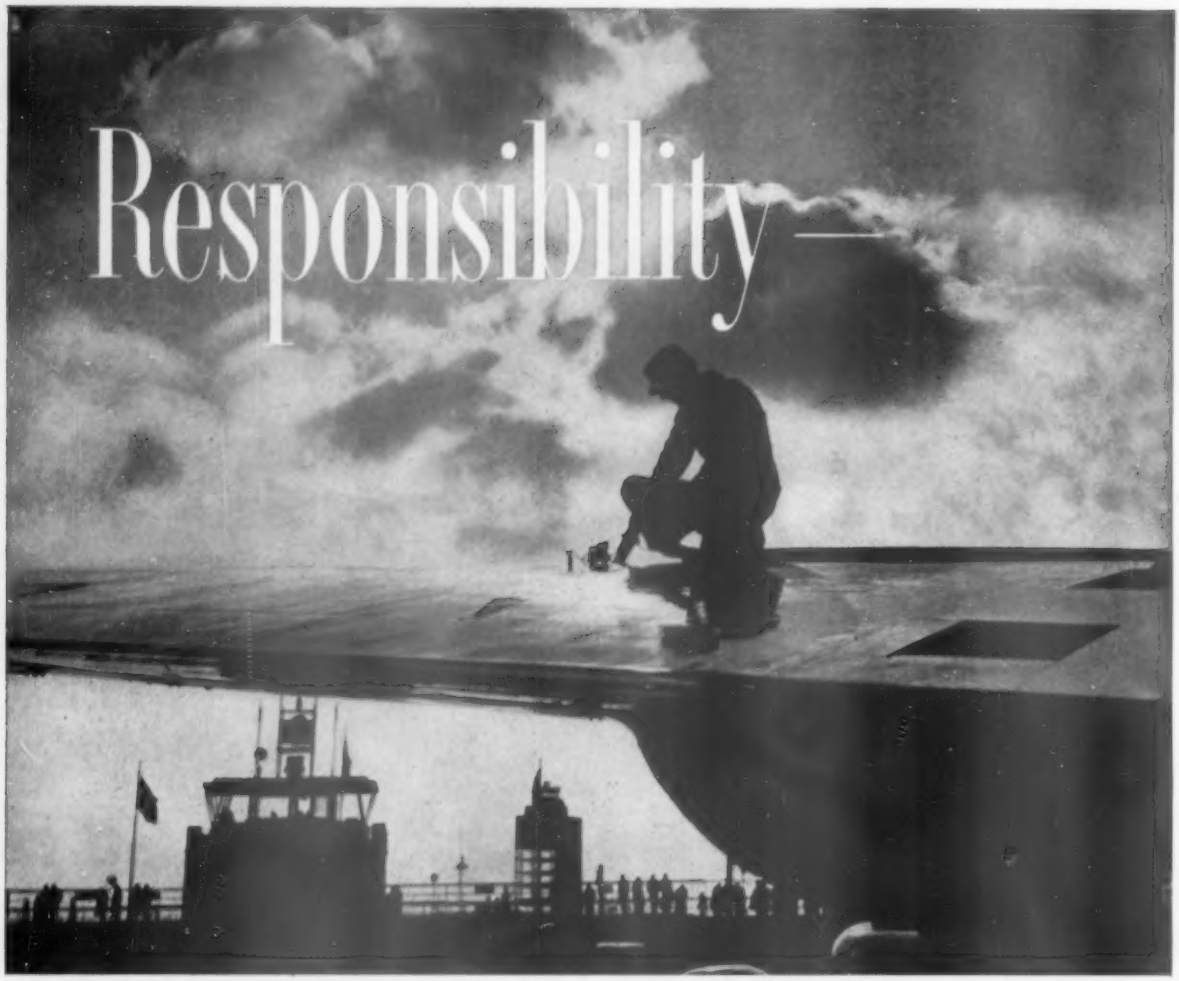
Look for the *Liquid Aluminum* foil label on the aluminum paint you choose. It is made to approved minimum standards that have been adopted by the many paint manufacturers who make *Liquid Aluminum*. These standards assure you of the best combination of elasticity and durability for longest life on most painting applications. Ask your paint supplier or write for names of manufacturers to Reynolds Metals Company, 2595 South Third Street, Louisville 1, Kentucky.

ONE-COAT PROTECTION FOR YOUR BUILT-UP OR RUSTABLE METAL ROOFS

It's *Liquid Aluminum* Roof Paint or Coating with this label and this warranty. They are your assurance of the best combination of elasticity and durability for long roof life. Aluminum reflects harmful sun rays to protect asphalt base against deterioration. Write for folder.



This advertisement appears in the interest of the Paint Industry of America



the essential ingredient in any gasoline

Tenamene helps protect the performance of your product

Gasoline has to meet many different specifications and performance standards. It has to function in a wide range of engines over a wide range of operating conditions. Yet, in the normal course of events, no control testing is done by the buyer. Gasoline is bought . . . put to use . . . and its quality is never questioned.

Because quality is "taken for granted," refiners must assume an unusual degree of responsibility. And they do. Gasoline delivered from their pumps is the end product of many carefully controlled processing steps.

One of these steps is the use of additives to prevent gum formation. Here, Eastman helps shoulder some of your responsibility. As a producer of Tenamene inhibiting and sweetening agents, Eastman constantly maintains their high quality and offers the interested service that aids in their proper and economical use. This service includes modern gasoline laboratories and a highly qualified technical staff—ready on short notice—to assist in the solution of refining problems related to Tenamene additives.

For more information contact our local representative or write to Eastman Chemical Products, Inc., Kingsport, Tennessee—a subsidiary of Eastman Kodak Company.

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tenn.; New York—260 Madison Ave.; Framingham, Mass.—65 Concord St.; Cincinnati—Carew Tower; Cleveland—Terminal Tower Bldg.; Chicago—360 N. Michigan Ave.; St. Louis—Continental Bldg.; Houston—412 Main St. **West Coast: Wilson Meyer Co.** San Francisco—333 Montgomery St.; Los Angeles—4800 District Blvd.; Portland—520 S. W. Sixth Ave.; Seattle—821 Second Ave.

Tenamene

EASTMAN GASOLINE ADDITIVES

how long-run advantages work for you...

When you power beam pumps, circulation systems, Triplex, lease or field injection pumps with Minneapolis-Moline Oilfield Engines, you save service hours never believed possible . . . actually change service dates from days to many months.

Equipped with exclusive long-run advantages such as the MM water-jacketed base pan which maintains oil at a determined constant temperature regardless of weather or load conditions, massive MM parts and larger bearing surfaces, vacuum crankcase ventilation, water by-pass cooling . . . built-in oil-flow controllers . . . sealed pressure cooling . . . all backed by MM's strict quality control . . . you get *lowest cost* production power per h.p. hour.

For complete facts and specifications, contact your Minneapolis-Moline oilfield distributor. Let him show you why you're *ahead* with MM power.

MINNEAPOLIS-MOLINE
MINNEAPOLIS 1, MINNESOTA

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SHRIMPTON
MANUFACTURING & SUPPLY CO.
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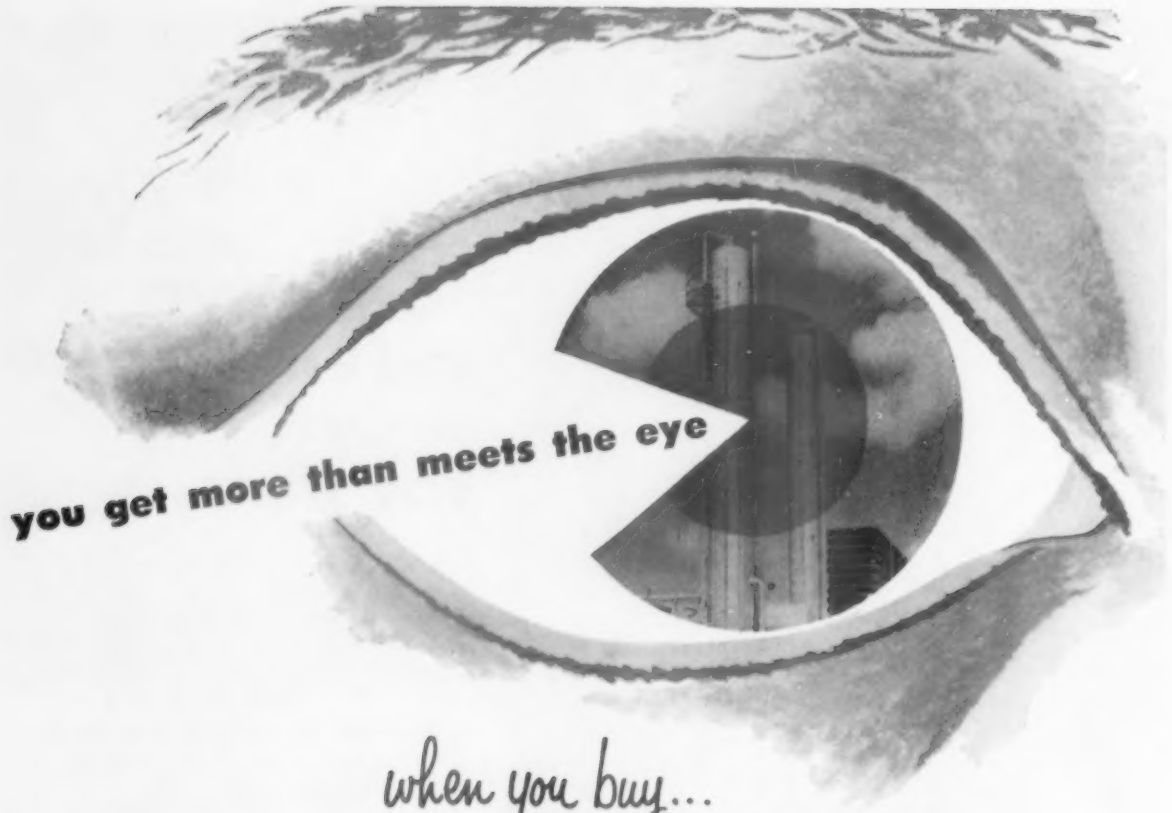

when you buy...

MONOETHANOLAMINE
DIETHANOLAMINE
DIETHYLENE GLYCOL
TRIETHYLENE GLYCOL

from **CARBIDE**

Yes! You get *more* than drums and tank cars of the best gas-treating chemicals . . .

YOU GET . . .

- the results of CARBIDE's 20 years' experience in their manufacture.
- the service of CARBIDE's field representatives.
- the assistance of CARBIDE's laboratories where specialists devote a great amount of time to work on customer service problems.
- the benefit of CARBIDE's knowledge about the handling, properties, and use of these chemicals.
- the assurance of availability and fast service through CARBIDE's national distribution network of 50 warehouses. (In Canada: Harrisons & Crosfield's.) Shipments are made in tank cars, tank wagons, and drums in carload or truckload lots.

REMEMBER: You get more *than chemicals when you do business with CARBIDE.*

CARBIDE AND CARBON CHEMICALS

Carbide and Carbon Chemicals Company
A Division of
Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.

Both engine and generator are mounted on a sturdy frame. Two-wheel mounting also available.

New P&H WN-250 Pipeliner

–an engine-driven arc welder developed by pipeliners to meet pipeline-welding requirements

Here you get everything you've ever wanted in a pipeline welder — including features you don't get from any other. Take a look:

(1) The P&H WN-250 is NEMA-rated at 200 amps—*but pulls 300 amps!*

(2) It has a full 20-gallon gas tank — runs all day on one tankful!

(3) It is powered by a four-cylinder, 180 GLU, Waukesha gasoline engine —direct-connected, water-cooled, and built for heavy duty. And we really mean *heavy* duty — it's not an automotive light-weight.

(4) P&H idling device establishes the rated speed of 1800 rpm as soon as the arc is struck. This speed is maintained for a set period after the arc is broken.

(5) P&H Dial-lectric Control provides stepless heat adjustment over the entire 3 ranges — with just a turn of a radio-type knob.

(6) Pre-lubricated bearings reduce the need for servicing and insure longer life.

(7) Auxiliary AC power-supply (1 KVA) permits flood-lighting and running power-tools.

There are other reasons why you're money ahead with a P&H WN-250. Ask your P&H representative or distributor for all the facts. Or, write for bulletin.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4527 W. National Ave., Milwaukee 46, Wis.

Continuous 8-hour welding test demonstrates the extra stamina of the P&H WN-250

You can't beat welding performance like this: In a recent test, the P&H WN-250 operated continuously for 8 hours on a 70% duty cycle.

A 5/32" electrode was used with 300 feet of cable. There were 250 amps. at the electrode. So that the test would be continuous, three welding operators were used. When one got tired, another took over. All used the drag technique with a 6010 rod — which is as close to a short circuit as you can get.

At the end of 8 hours, the P&H generator was still cool. And the WN-250 was still rarin' to go—the weldors were worn out, but not the machine.

the P&H *Line*

2595A

P&H Welding equipment is manufactured and sold in Canada by
REGENT EQUIPMENT MANUFACTURING COMPANY LTD.
455 King Street West • Toronto, Ontario, Canada

*FIRST LINE *Extended-Surface* HEAT EXCHANGERS

ASK THE AEROFIN MAN

Specify Aerofin and you specify high efficiency, long service life and low maintenance and service costs.

Take advantage of Aerofin's unequalled experience, production facilities, and materials-testing and design research—of Aerofin's complete engineering service at the plant and in the field.

Ask the Aerofin man.

* Aerofin makes extended heat surface exclusively — not as a by-product, not as a side-line. Sold only by manufacturers of fan-system apparatus. List on request.

AEROFIN CORPORATION
101 Greenway Ave., Syracuse 1, N. Y.

Unusual Tree,

But as Usual...

ROCKWELL Nordstrom VALVES

Certainly—you expect to find Rockwell-Nordstrom lubricant-sealed valves on all kinds of Christmas trees.

As it happens, this is a tree in the Freer Field, Duval County, Texas, with 15,000 lb. test, 10,000 lb. working pressure Rockwell-Nordstrom valves.

But it could be a low pressure tree, and it could be in California, or Arabia, or anywhere else where oil and gas flow from the ground.

No flowing well is safer than the valves that control it, and no valves are safer than Rockwell-Nordstrom. In Christmas tree service, where valves may stand in one position for long periods, yet must operate quickly and surely in an emergency, the Rockwell-Nordstrom principle of internal lubrication is especially important. The lubricant jacks the plug off the valve seat, and at the same time gives a slick surface for almost friction-free operation.

There is a proper Rockwell-Nordstrom valve for any Christmas tree service, readily available through oil country supply stores everywhere. Rockwell Manufacturing Company, Pittsburgh 8, Pa. *Canadian Licensee: Peacock Brothers Limited.*

ROCKWELL
Nordstrom
VALVES

Lubricant-Sealed for Positive Shut-Off

ANOTHER WAY YOU SAVE WITH FORD *TRIPLE* ECONOMY

WATCH OUT FOR KIDS!

Ford *Master-Guide* Power Steering provides boulevard steering ease even under rough off-road conditions.

Now! Steering effort cut 75%

New Ford *Master-Guide* Power Steering reduces manual effort as much as 75%, cuts road shock, helps driver get more work done!

FORD, pioneer in driver comfort with the *Driverized* Cab, now offers Power Steering for still greater ease of control. New *Master-Guide* is standard on new Tandem-Axle models with *Cargo King* V-8 engines, available at extra cost on most other BIG JOBS.

Master-Guide practically frees the steering wheel from tiring road shock. A full-time system, it supplies up to 75% of the effort required for steering . . . a real boon in parking, maneuvering, or off-road driving. By reducing driver fatigue, it increases work output and lowers your over-all trucking costs.

For complete information, see your Ford Dealer *today!* Or write: Ford Division, Ford Motor Co., Dept. T-20, Box 658, Dearborn, Michigan.

New Ford T-800 Tandem-Axle BIG JOB—factory-built for low first cost—is rated at 60,000 lbs. GCW, 40,000 lbs. GVW. Powered by LOW-FRICTION, Short-Stroke 170-h.p. *Cargo King* V-8 that delivers up to 41% more horsepower per cubic inch displacement than other engines in its class.

SAVE WITH ALL THREE!

1. Gas-Saving Power!
2. Driver-Saving Ease!
3. Money-Saving Capacities!

And . . . Ford Trucks last longer, too!

FORD

TRIPLE ECONOMY

TRUCKS

"WORLD'S LARGEST TRUCK"

USES VICKERS® HYDRAULICS for STEERING and [illegible]ING

Dart Model 60 Truck is shown carrying full 75-ton payload.

This Dart behemoth with a gross vehicle weight of 240,000 lb is said to be the largest truck in the world. It has two engines totaling 700 horsepower. Everything about it is on a colossal scale.

A new hydraulic circuit was developed by Vickers expressly for Model 60. The driver steers this truck with no more effort than he would a passenger car as the steering gear merely actuates the valve that controls the flow of oil to the steering cylinders. Twin cylinders provide 50,000 lb steering force (at 1000 psi oil pressure) for the dual front wheels.

Dart is thoroughly familiar with the many advantages of Vickers Hydraulic Power Steering having used it since 1938.

Vickers hydraulic equipment is available for all types and sizes of mobile equipment. Ask for new Catalog M-5101.

Vickers hydraulic power dumps the load; twin hoists are rated at 130,000 lb push at 1000 psi oil pressure.

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REPRESENTATIVE STANDARD VICKERS UNITS USED ON DART MODEL 60

6526

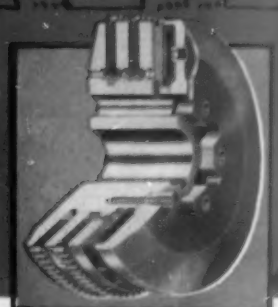
ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

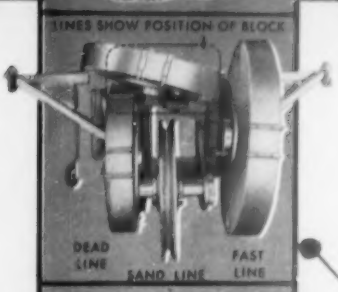
POWER SPEED SAFETY

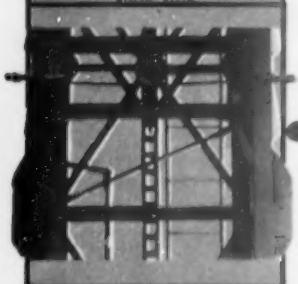
SUPER "38" WINCH & SUPER 65' MAST

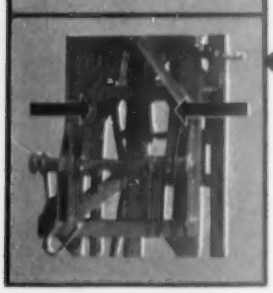
have these MODERN, EXCLUSIVE Features

All Drives Equipped with WICHITA AIR-TUBE DISC CLUTCHES







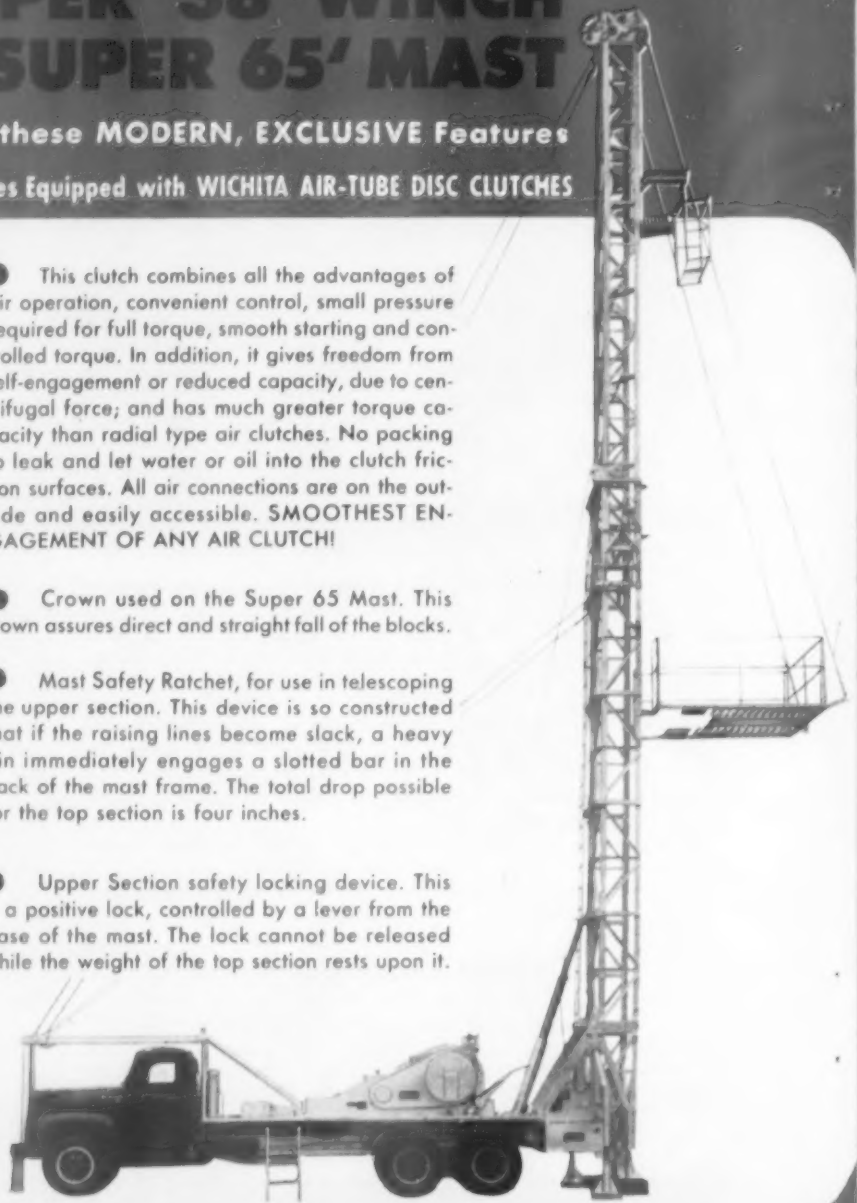


- This clutch combines all the advantages of air operation, convenient control, small pressure required for full torque, smooth starting and controlled torque. In addition, it gives freedom from self-engagement or reduced capacity, due to centrifugal force; and has much greater torque capacity than radial type air clutches. No packing to leak and let water or oil into the clutch friction surfaces. All air connections are on the outside and easily accessible. SMOOTHEST ENGAGEMENT OF ANY AIR CLUTCH!

- Crown used on the Super 65 Mast. This crown assures direct and straight fall of the blocks.

- Mast Safety Ratchet, for use in telescoping the upper section. This device is so constructed that if the raising lines become slack, a heavy pin immediately engages a slotted bar in the back of the mast frame. The total drop possible for the top section is four inches.

- Upper Section safety locking device. This is a positive lock, controlled by a lever from the base of the mast. The lock cannot be released while the weight of the top section rests upon it.



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WILSON MANUFACTURING CO., Inc.

THE HOME OF RED IRON
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BE MODERN
BUY WILSON

KING SIZE

This giant 37 ton Cat Poly Reactor is one of 4 units shipped to a large petroleum refinery in the State of Washington. It is 4'-3½" in diameter by 32'-0" long and has a 1 3/16" thick shell. Each of its 8" thick heads is attached to the shell channel with 28 special alloy stud bolts 2¾" diameter by 15¼" long having nuts 4¼" across the flats. Into the 5¾" thick tube sheets 190 tubes, 2½" O. D., No. 5 gauge and 30'-0" long, are rolled and seal welded. Designed for 1,230 lbs. pressure on the tube side, the reactor was completely X-rayed and stress relieved.

Vogt, a leading builder of shell and tube reactors for poly plants, has the competently skilled personnel and modern mechanical facilities with which to provide heat transfer equipment for the most exacting services in petroleum refineries, chemical plants, and related industries.

Reactors ...by Vogt

A bulletin describing the wide range of heat transfer equipment built by Vogt is available upon request.

HENRY VOGT MACHINE CO., LOUISVILLE, KENTUCKY

BRANCH OFFICES: NEW YORK, CHICAGO, CLEVELAND, DALLAS, PHILADELPHIA, ST. LOUIS, CHARLESTON, W. VA

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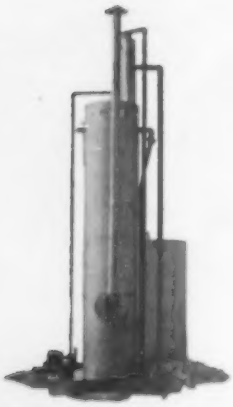
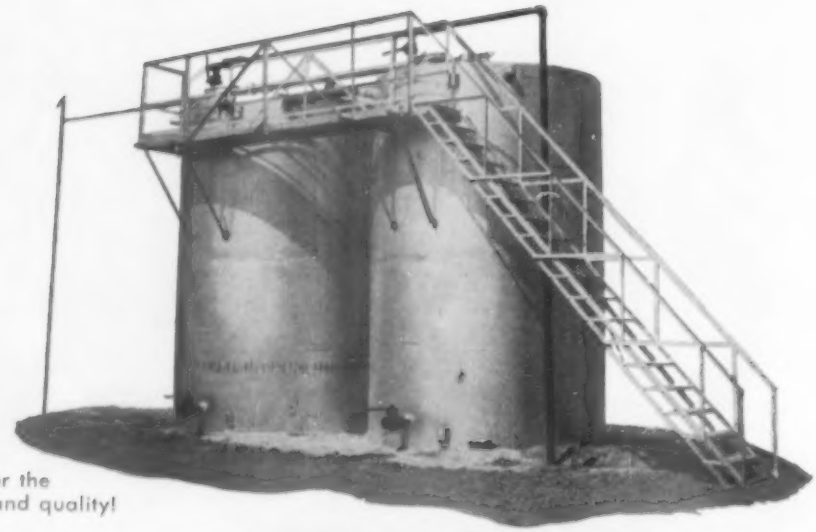
Dunham Tanks





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A fresh, new competitive picture for the tank market brings better service and quality!

MODERN

Our Minden, Louisiana, plant has been equipped with the latest and most modern mechanical equipment available. This means faster and more efficient production!

EXPERIENCE

Dunham Tanks are designed and supervised by experienced engineers who have years of tank manufacturing knowledge and know-how. This experience has already corrected many faults prevalent in equipment in the field. It is your guarantee for a better job!

SERVICE

Try us today for prompt, courteous, competent and reliable service! Sales offices are at Lafayette and Shreveport, La.; Kilgore and Corpus Christi, Texas; and, Seminole and Perry, Oklahoma. We will open more offices as soon as competent men can be hired and trained.

Our Minden, Louisiana, plant

OFFICES AND STOCKING POINTS: SHREVEPORT, LOUISIANA, P. O. BOX 6597, PHONE 7-2475; LAFAYETTE, LOUISIANA, 119 N. MAGNOLIA, PHONE 5-1338; KILGORE, TEXAS, P. O. BOX 97, LAIRD HILL STATION, PHONE 7404; SEMINOLE, OKLAHOMA, P. O. BOX 965, PHONE 262; PERRY, OKLAHOMA, 614 MAPLE STREET, PHONE 737-J; CORPUS CHRISTI, TEXAS (LESTER MOORE TANK & SUPPLY CO.), P. O. BOX 1762, PHONE 5-6595.

ANDERSON-DUNHAM, INC. DUNHAM TANKS TANK DIVISION

DUNHAM TANKS

DIVISION OF ANDERSON-DUNHAM, INC., BATON ROUGE, LA.

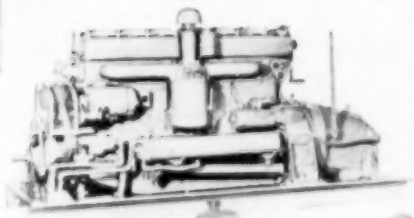
11,000 HOURS

of tough oil field service and still going strong . . .

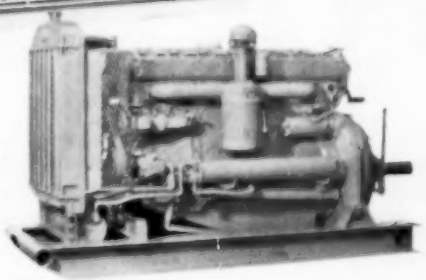
That's Murphy Diesel's Record in the "Lacache"

● Since its Murphy Diesel was started in August, 1951, the "Lacache" has piled up over 11,000 engine hours serving drilling barges and other tough oil-field service . . . and the engine is still going strong. The "Lacache" is a 59 footer and her engine is a 190 H.P. Murphy which swings a heavy duty 52"x 32" 3-blade propeller.

If it's long, dependable service with minimum operating cost that you're looking for, Murphy Diesel is the answer. So before you decide on an engine for that new boat or for repowering an existing one, be sure to talk to your Murphy Diesel Dealer.



Murphy Diesel Marine Engines for all types of boat service, 90 to 225 H.P.



Engines and power units for drilling and pipeline pumping, 90 to 260 H.P. Dual-fuel engines, 135 to 215 H.P.

MURPHY DIESEL COMPANY • 5305 W. Burnham St. • Milwaukee 14, Wisconsin

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ALBUQUERQUE, NEW MEXICO, Lively Equipment Company; BUTTE, MONTANA, Hall-Perry Machinery Company; CORPUS CHRISTI, TEXAS, Houston Engine & Pump Company; DALLAS, TEXAS, Conley-Lott-Nichols Machinery Co.; DENVER, COLORADO, Power Equipment Company; EDMONTON, ALBERTA, CANADA, Northern Engine & Equipment Co., Ltd.; GREAT BEND, KANSAS, Manufacturers Dist. Co.; GREAT FALLS, MONTANA, Hall-Perry Machinery Company; HOUSTON, TEXAS, Houston Engine & Pump Co., Inc.; JACKSON, MICHIGAN, Utility & Industrial Supply Co.; LOS ANGELES, CALIFORNIA, Industrial Engine Service; LUBBOCK, TEXAS, Conley-Lott-Nichols Machinery Co.; SAN ANTONIO, TEXAS, The Roy Klossner Company; BAKERSFIELD, CALIFORNIA, Glenn Rose Engine Service; ODESSA, TEXAS, Conley-Lott-Nichols Machinery Co.; LONGVIEW, TEXAS, Nichols Machinery Co.

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KRALASTIC® PIPE

eliminates

all this!

Kralastic rubber-resin, one of the first materials to produce successful plastics pipe, offers you a combination of money-saving advantages *no other pipe material can match!*

Kralastic pipe can't rust! No matter how muddy or acid the soil, Kralastic pipe is completely unaffected. Because it is a natural electric insulator, it ends all need for pipe coating, wrapping, or cathodic protection.

Kralastic pipe is lightweight! Half a dozen or more 20' lengths of pipe, with all the necessary fittings, can easily be carried by one man. There's no waste of time, men, and equipment with Kralastic.

Kralastic can be solvent welded! Just one man with a paintbrush makes up fittings in seconds. No threading necessary. And Kralastic pipe can be cut to length with a few quick hacksaw strokes.

What's more, Kralastic is one of the *toughest* of all plastics. And it has sufficient flexibility to follow uneven ground contours, and even to be snaked through existing lines!

You'd better investigate Kralastic pipe—the *superior* pipe for the transport of petroleum crude, *natural gas*, water, brine, and a variety of chemicals. Why not write to us today?

50th ANNIVERSARY 1804 1954 NAUGATUCK CHEMICAL

Naugatuck Chemical

Division of United States Rubber Company

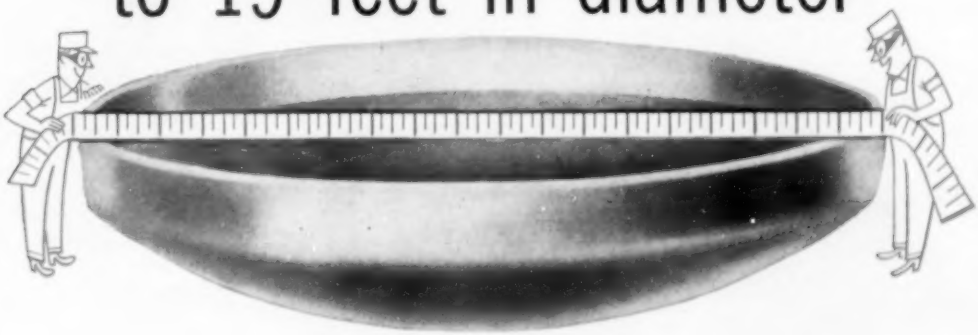
489 ELM STREET, NAUGATUCK, CONNECTICUT

BRANCHES: Akron • Boston • Charlotte • Chicago • Los Angeles • Memphis • New York • Philadelphia • IN CANADA: Naugatuck Chemicals, Elmira, Ontario

CLAYMONT FLANGED AND DISHED HEADS

from 9 inches

to 19 feet in diameter



Flanged and dished heads made by Claymont are available in sizes from as small as 9 inches to as large as 19 feet in overall diameter; and in gauges from ⅜-inch to 6 inches. They can be supplied in carbon steel, alloy steel or with stainless steel cladding.

All carbon and alloy steels are the product of our own open hearth furnaces—closely and completely controlled to meet customers' specifications.

We are also prepared to handle head-forming operations on both ferrous and non-ferrous metal supplied by the customer. To order, write or call Claymont Steel Products Department, Wickwire Spencer Steel Division, 813 West Street, Wilmington 99, Delaware.

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CF&I

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation

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Other Claymont Products . . . Carbon and Alloy Steel Plates • Stainless-Clad Plates • Manhole Fittings and Covers • Large Diameter Welded Steel Pipe • Flame Cut Steel Plate Shapes

For Temperature Control

$35 Nicholson Trap Replaces $200 Unit

Again demonstrating their remarkable effectiveness as a low-cost temperature control, a large processor reports Nicholson expansion steam traps, at about $35 each, are being installed on outdoor tanks and stills in place of temperature controls. These were costing $110.00 to $200.00, with cost of trap added.

The Nicholson traps are readily adjusted to pass condensate at any temperature below 212°F. No air binding. Lengths 9" to 40". Easily installed, usually without supports. Pressure, 0 to 250 lbs.

For All Equipment Using Steam or Hot Water

Dryers	Kettles	Retorts
Evaporators	Paper Machinery	Separators
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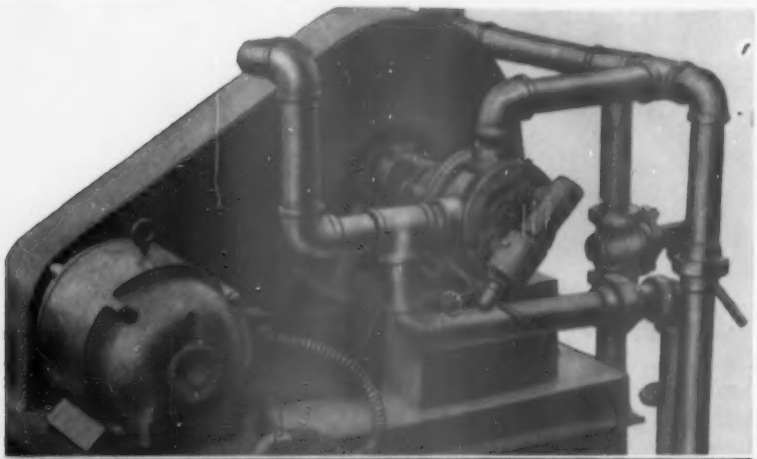
Heaters	Radiators	Storage Tanks

CATALOG 953

210 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.

TRAPS · VALVES · FLOATS



SMOOTH OIL CIRCULATING SERVICE with VIKING ROTARY PUMPS

The smooth, even flow of heavy-duty Viking pumps makes ideal oil circulating service in the treatment of crude. Positive, self-priming action without agitation is also an important feature.

You, too, can have service of this kind. Start today and ask for bulletins 3001T and 2501T.

VIKING AN HONORED NAME IN PUMPING

See Our Catalog in SWEET'S

VIKING PUMP COMPANY CEDAR FALLS, IOWA

They Say—

The Boss and the Customers

"... There is still one thing that we all have in common—we're doing business through people and with people. The first group, the ones we work through, determine how we'll do with the second group, our customers . . .

"... To achieve your profit objective you're going to have to enlist the full cooperation of your employes . . . They must be made to feel that they're members of the team.

"At Standard we like to call this 'Standard Oil Spirit.' Maybe that sounds a little collegiate to some of you. But I assure you it's more than the feeling that you get when the brass band goes by. It's a feeling . . . that the company takes care of its own. It's a certain knowledge that an employe who takes a personal pride in his work, and a personal satisfaction in the success of the business, can expect to be repaid in kind.

"It's not merely a 'you scratch my back and I'll scratch yours' arrangement . . . Any man worth his salt likes to do his work well; he likes to feel that he's succeeded; and likes to know that the people he works for recognize and appreciate it . . ."

E. J. McClanahan, vice president, Standard Oil Co. of California, in a speech before the Congress of Petroleum Retailers at a San Francisco meeting.

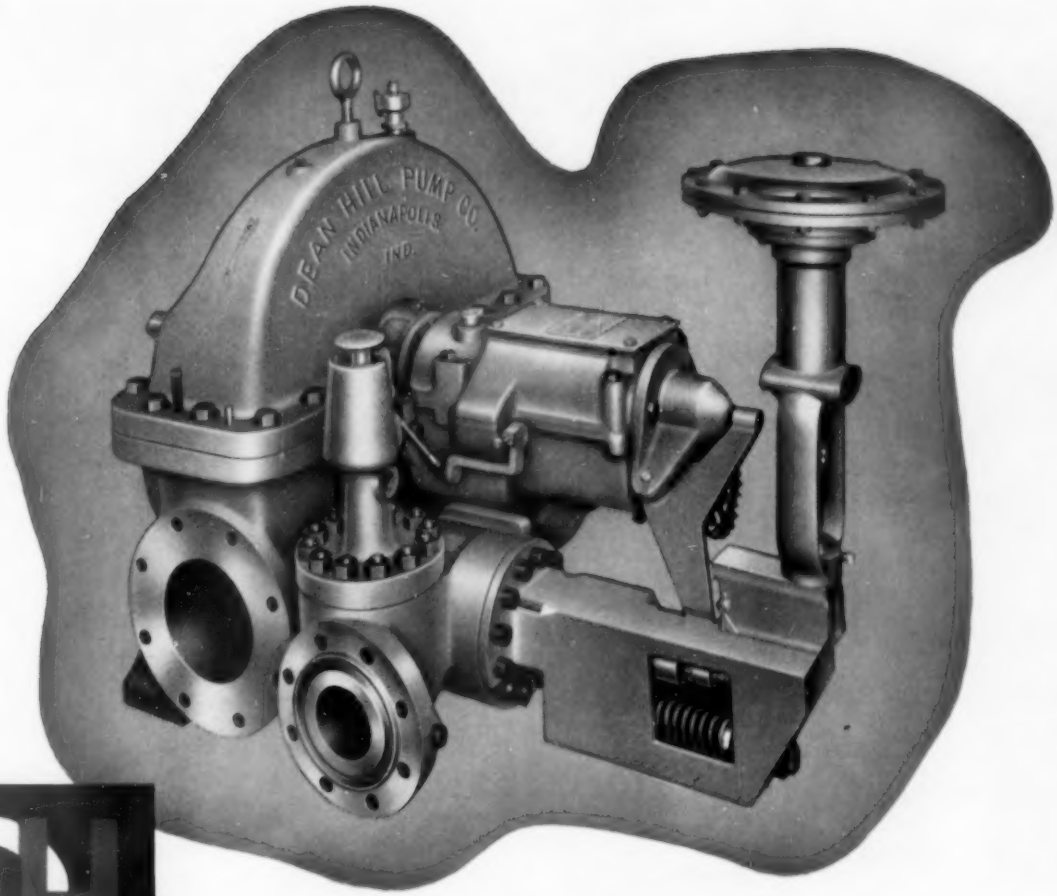
Another Unhappy Ohioan

Dear Sir:

No doubt you have heard of the recent cutback in the so-called oversupply of oil in Ohio . . .

Ohio . . . has been dealt a severe blow. The major problem is . . . shipments of "foreign oil to Ohio." This not only means oil from the Far East and Venezuela, it includes oil from the Illinois basin and points west.

According to The Oil and Gas Journal, there are approximately 380,000 bbl. of oil refined daily in Ohio. The astounding and preposterous fact is this of the 380,000 bbl. . . . we producers furnish roughly 2 per cent . . . Our production was cut 25 per cent



D-H turbines with pressure regulators solve constant fluid pressure problems

Dean Hill Turbines equipped with pressure regulators are "made to order" for boiler feedwater applications requiring precise, automatic pressure control. Regulators can be used with any turbine model of either horizontal or vertical design and are furnished with direct-acting or remote control. They can be arranged to maintain a constant pump discharge pressure or a constant differential pressure over the boiler pressure.

The regulator controls all turbine speeds up to normal rating, but above this point the turbine governor overrides the regulator to prevent overspeeding. The emergency trip valve remains independent.

To effect maximum efficiency of control and eliminate lost motion and deflection, the regulator is mounted on a rugged support made of welded six-inch channels.

For further information on D-H Turbines and optional accessories

write today for Catalog 500.

DEAN HILL PUMP COMPANY

Pump and Turbine Engineers Since 1893

Indianapolis 7, Indiana

Sales Offices In:

Chicago, New York, San Francisco, Boston, Cincinnati, Denver, Albuquerque, El Paso, Salt Lake City, New Orleans, Philadelphia, Tulsa, Los Angeles, Pittsburgh, Houston, Dallas, St. Paul, Toledo, Cleveland, Grand Rapids, Birmingham, Ala., Louisville, Memphis, Richmond, Mexico City, Montreal, Reading, Pa., The Hague, Washington, Charlotte, Casper, Wyo., Knoxville.

an ACCO product

Helicoid Gages

Flutter Won't Hurt Them!

HELICOID Gages are designed to withstand many millions of pressure pulsations. Flutter and rapid surges have no effect on their accurate performance in long-life service. Tests show 75,000,000 cycles at 1200 pulsations per minute without wear.

1. There are no gears to wear out

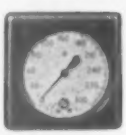
Only HELICOID Gages offer this long-lasting gage movement. There are no gears, no teeth to wear out. Cam wiping action keeps contact points clean and smooth.

2. Bourdon tubes won't stretch, leak or crack

Bourdon tubes in HELICOID Gages give maximum torque and minimum stress to promote greatest possible endurance life. Will withstand millions of pressure pulsations without stretching, leaking or cracking.

HELICOID Gages
for Pressure, Vacuum or Compound Service

There are HELICOID Gages for all pressure ranges —with white, black or radiant faces—wall, stem, flush and panel mountings for flangeless cases. See your distributor today or write for **Catalog G-2.**



Helicoid Gage Division
AMERICAN CHAIN & CABLE
927 Connecticut Avenue • Bridgeport 2, Connecticut

Pressure • Vacuum • Compound

for July and 40 per cent for August. . . . In light of our small production with such a tremendous cutback, many producers will be forced out of business.

I feel confident that the major refineries in Ohio could easily work out a solution that will allow the small producers their equal and just share . . .

Herman B. Rogovy
President
Mutual Oil & Gas Co.
Zanesville, Ohio

He Prefers In-fill Drilling

Dear Sir:

I think your editorial "How to Save Money and Gas Too" in the August 16 issue of The Oil and Gas Journal is great. We have been saying that it is always possible to do in-fill drilling, but it is impossible to "undrill" wells.

It seems to me that your suggestion of wide spacing to begin with and in-fill drilling later should be the logical approach. This gives both the wide-spacing fellows and the close-spacing proponents an opportunity to observe the actual performance of a reservoir, protect the equities of every one who owns rights in the reservoir, and to allow corrective steps to be taken in case the early estimate as to proper spacing is in error . . .

Paul C. McDonald
Production Manager
Murphy Corp.
El Dorado, Ark.

Depletion Debate

"I think there is no question but that the 27½ per cent allowance is weighted very much in favor of the big operators.

"On the floor this afternoon, as in 1951, we heard the claims of the wildcatters or small independent operators advanced. I think they have a case. . .

". . . I think it is probably true that in the case of the wildcatter there must be an additional inducement in order to stimulate those who believe in taking risks and chances to do the drilling and develop the industry. . ."

Sen. Paul Douglas of Illinois in his argument in the Senate for a graduated depletion allowance.

Douglas No Texas Fan

"One of the most persistent foes of the move in Congress to restore the tidelands to their rightful owners, Sen. Douglas (of Illinois) is not content to rest with the plain intent of the law which made that restitution. He finds time in recent days to demand that Atty. Gen. Brownell try to clip off the outer reaches of Texas' historic boundaries of its tidelands.

"The Senator charges politics with

The reason? SPANG CW Steel Pipe is uniform in every respect . . . a result of quality-controlled manufacturing.

SPANG CW has strong uniform welds. During the forming and welding of SPANG Pipe, automatic heat control eliminates temperature deviations. This produces highest quality welds and assures uniform pipe strength through the entire length of pipe.

SPANG CW has uniform diameter. Finished pipe is carefully sized and straightened to assure uniformity. Careful testing and inspection eliminates any CW pipe that does not come up to SPANG's high standard.

The result? SPANG CW Steel Pipe is easy to work with . . . easy to cut, bend, thread and weld. It saves time on the job . . . gives you faster installations . . . and it's built for years of rugged oil country service.

SPANG CW Steel Pipe is tops for water systems, oil gathering systems, air lines, gas lines, salt water disposal systems and water flooding lines. SPANG CW is available in a full range of sizes at all National Supply Stores. Try it on your operations!

NATIONAL BLUE PRODUCTS

SPANG-CHALFANT DIVISION

THE NATIONAL SUPPLY COMPANY

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OIL TOOLS COMPANY

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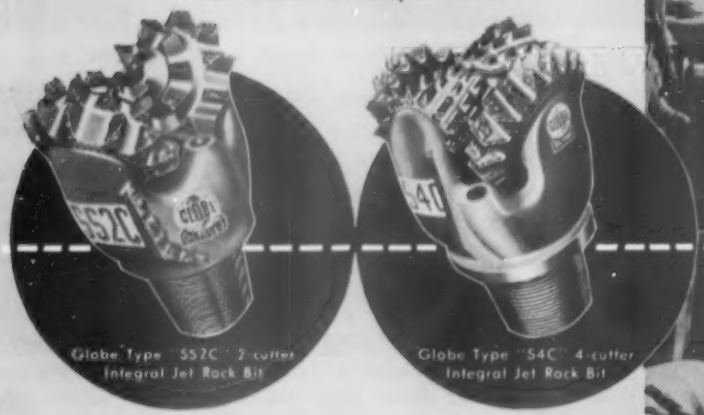

Globe Type "S52C" 2-cutter Integral Jet Rock Bit

Globe Type "S4C" 4-cutter Integral Jet Rock Bit

GLOBE INTEGRAL JET ROCK BITS
are setting a *New Standard* for oil well drilling

being behind the Texas projects. Since he is doing most of his campaigning for reelection this fall from the floor of the Senate, it is obvious that he thinks anti-Texas speeches and actions are good politics in his home state."

Editorial in the Dallas Morning News.

How to Cut Inventories

"The present situation could be improved by continued curtailment of crude-oil supplies and by reduction in refinery throughput until late in the year when requirements for the heating oil season will necessitate an increase."

S. A. Swensrud, chairman, and W. K. Whiteford, president, Gulf Oil Corp. in a letter to stockholders.

Why Profits Declined

"Profits were adversely affected by a decrease of 7.5 per cent in the company's net crude production, which was caused by sharply reduced allowables in some states. Other factors reducing earnings were increased amortization charges and a sharp drop in aviation-gasoline sales to the military."

Robert E. Wilson, chairman, and A. W. Peake, president, Standard Oil Co. (Ind.) in a letter to stockholders.

Here's His Guess

Dear Sir:

Reference the D'Arcy Exploration Co., Ltd., well near Vittoria, Sicily, mentioned in your magazine of August 2, 1954, page 76.

In my estimation, when and if this well is drilled to 12,500 ft., seven sands will be found as follows: 3,560-3,595 ft., 12° gravity; 5,590-5,645 ft., 19° gravity; 8,444-8,532 ft., 21° gravity; 9,255-9,374 ft., 6° gravity; 10,386-10,-526 ft., 37° gravity; 11,941-11,962 ft., 26° gravity; and 12,152-12,374 ft., 49° gravity.

Dr. Quentin Zeckley
Pacific Palisades, Calif.

Hono-LULU of a Traffic Jam

Dear Sir:

Reference your article on traffic density in Journally Speaking, June 21 issue of The Oil and Gas Journal.

. . . Hawaii has 76 (motor vehicles per mile of highway). Highest concentration is on the island of Guam, which has 134 motor vehicles for each of its 66 miles of highway. . .

Too bad that you ignored the concentration on the island of Oahu, on which the city of Honolulu is located. At the end of 1953, there were 125,428 motor vehicles on Oahu, which has 640 miles of public streets and highways, or more than 195 vehicles for every

APPROVED

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for Bubble-tight Primary Shut-off in L P GAS LINES

Underwriters' Laboratories, major LP gas producers*, and Liquified Petroleum Gas Commissions of several States* approve Okadee Valves for primary shut-off in LP gas lines. In addition, Okadee Valves are used in virtually all types of gas and liquid lines at pressures to 600 p.s.i. and temperatures to 800°F.—wherever a perfect seal, low maintenance and long life are necessary.

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**Names on request.*

- A. S. A. Standard dimensions
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- Single- and double-seated disc valves
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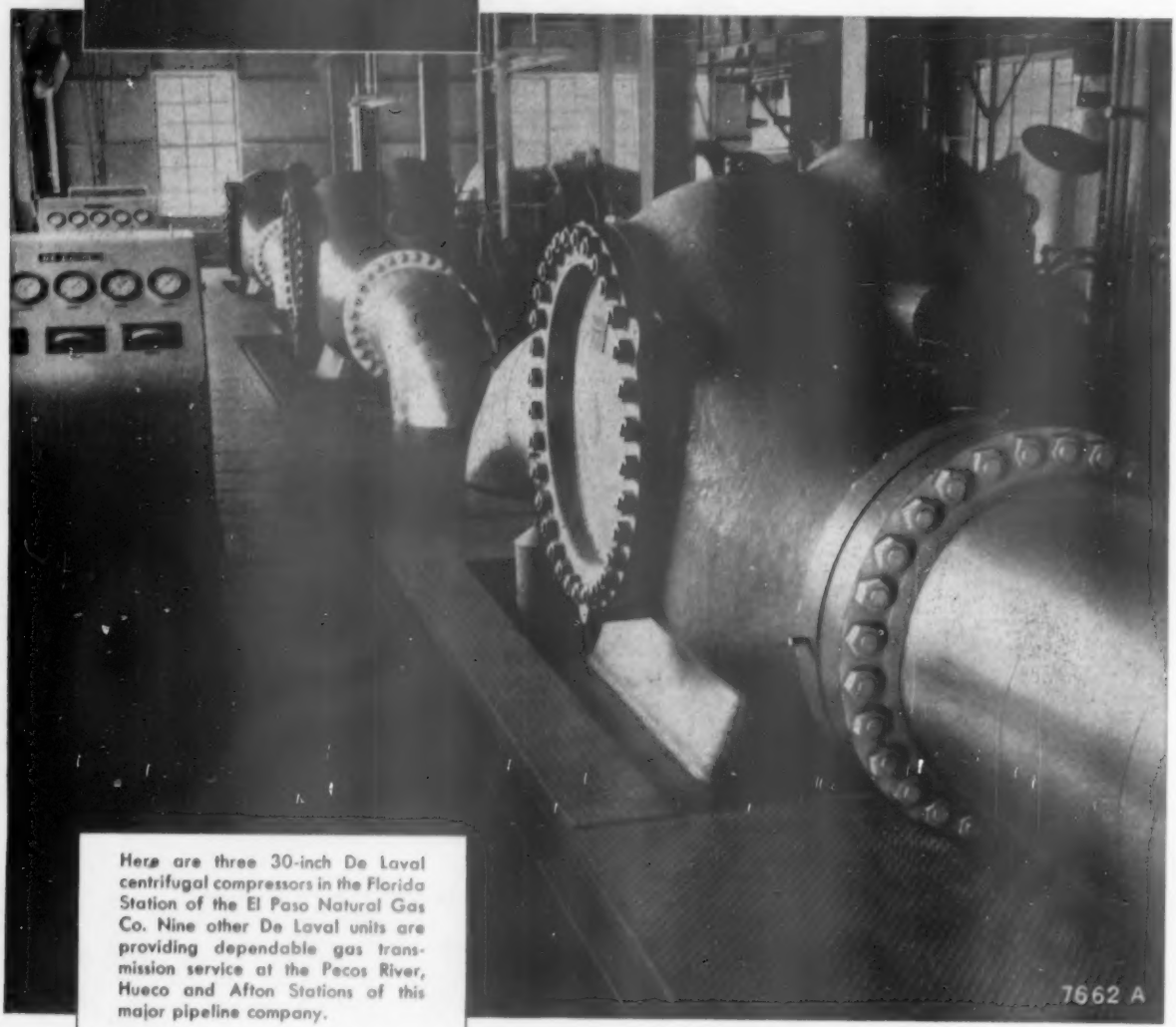
- Non-lubricated
- No wedge action
- Valves and seats wear in instead of "wearing out"
- All parts quickly replaceable in the field
- Inside and outside stem packing . . . double assurance against stem leaks

Underwriters' Laboratories Reexamination Service Guide No. 141 A3.1.22, File MH5163. SL Screwed Type Series and Series 15 and 30 Flanged Type Okadee Valves are suitable as a positive shut-off in LP gas pipelines and other LP gas applications for a working pressure of 250 p.s.i.

Write for Bulletin No. 51FL

Okadee COMPANY
332 South Michigan Avenue • Chicago 4, Illinois

DE LAVAL CENTRIFUGAL COMPRESSORS *on the job at El Paso Natural Gas*



Here are three 30-inch De Laval centrifugal compressors in the Florida Station of the El Paso Natural Gas Co. Nine other De Laval units are providing dependable gas transmission service at the Pecos River, Hueco and Afton Stations of this major pipeline company.

De Laval centrifugal compressors offer many important engineering features. (1) They are designed to handle an increased ultimate flow, can be quickly converted to larger capacities by replacing the impeller, diaphragm and a few minor parts. (2) The high pressure shaft seal eliminates leakage, consumption of sealing oil is negligible. (3) There is only one moving part — the rotor — which has ample clearance. (4) Units are compact, require smaller foundations and smaller stations. (5) First costs and installation costs are low.

If you want detailed data on all the design advantages of De Laval centrifugal compressors, consult our engineers. They will be glad to give you the benefit of our wide experience on major pipelines.

DE LAVAL *Centrifugal Compressors*

DE LAVAL STEAM TURBINE COMPANY
810 Nottingham Way, Trenton 2, New Jersey

DL 220

mile of road. This total motor vehicle registration . . . does not include military vehicles. . .

. . . The ratio of cars to population on Oahu is 1 car per 2.6 persons.

Edward N. Howard
Chief Boilerman, U.S.N.

Progress in Pipelining

"A busy pipeline season with all spreads working in different locations makes one realize how much pipelining has changed and progressed during the past 10 years, particularly in the matter of transportation and communications.

"The use of short-wave radio between field offices and the various gangs of the line has greatly speeded up operations and maintenance.

"The use of company-owned airplanes has greatly facilitated the travel of supervisory personnel, and all spreads can be covered more frequently today than in the past . . .

"For the past 2 years our company has experimented with the use of helicopters on the spreads laying pipe in rough and inaccessible country. By their use we have saved many hours in the shipment of parts for emergency repairs and the transfer of personnel . . ."

Harold C. Price, president of H. C. Price Co., writing in the Tie-In, company publication.

CALENDAR OF EVENTS

SEPTEMBER

- **7-9** Association of Desk and Derrick Clubs of North America, annual convention, Banff Springs Hotel, Banff, Alta.
- **8-10** Pacific Coast Gas Association, sixty-first annual meeting, Vancouver Hotel, Vancouver, B. C.
- **9-11** Billings Geological Society, annual field conference, Billings, Mont.
- **9-11** Interstate Oil Compact Commission, Omaha, Neb.
- **10** Southern Gas Association, conference on compressor-station operation, Jung Hotel, New Orleans.
- **12-16** American Institute of Chemical Engineers, Colorado Hotel, Glenwood Springs, Colo.
- **12-17** American Chemical Society, 126th national meeting, New York.
- **13-14** Independent Natural Gas Association of America, annual meeting, Roosevelt Hotel, New Orleans.

"Finest Thread Protection" means using either of these WECO Compounds. They both exceed the requirements for maximum thread protection . . . for minimizing galling . . . for sealing without freezing. WECO Compounds require no thinner, will not harden, are not affected by hot or cold weather.

Give your tool joints and drill collars the finest thread protection and they'll give you longer, better service.

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These who prefer a zinc base compound should specify NO-GALL. It contains more than 50% pure metallic zinc.

LO-TORK 50% LEAD BASE

If you want a lead base compound, specify LO-TORK. It contains 50% finely screened metallic lead.

WECO-API High Pressure Thread Compound now available

it's wise to standardize with.. **WECO**

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For Industrial Roofing & Siding

specify Grade-Marked

Galvanized Sheets

for PEAK PERFORMANCE

Engineers and designers of industrial and commercial buildings know galvanized sheets to be superior building material for this type of construction—particularly for roofing and siding. They know that time-tested galvanized sheets offer:

- **SHORT-TERM *plus* LONG-TERM ECONOMY**
  Low *initial* cost, low *application* cost, low *per-year* cost
- **STRENGTH OF STEEL; RUST-PROTECTION OF ZINC**
  Withstand rough treatment, add structural strength and are fireproof

All galvanized sheets give years of useful service. But the *heavier* the zinc coating, the *longer* the life of the base sheet. Because various weights of zinc coating look alike on the surface, it pays to *specify a grade-marked sheet* . . . Get the heaviest coating you can buy!

ZINC INSTITUTE 2 OZ. COATING SEAL OF QUALITY

IT'S THE ZINC THAT STOPS THE RUST

For long, rust-free service, specify a heavy duty sheet such as the "Seal of Quality" with a zinc coating of *2 ounces per square foot.* For heavier coatings order according to ASTM Specification A 93.

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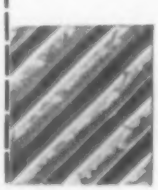


13-25 Instrument Society of America—First International Instrument Congress and Exposition, Museum and Convention Hall, Philadelphia.
14-15 National Association of Corrosion Engineers, South Central region, Dallas.
15-16 American Gas Association, sixth annual accident-prevention conference, Bond Hotel, Hartford, Conn.
15-17 American Petroleum Institute, lubrication committee, Traymore Hotel, Atlantic City, N. J.
15-17 National Petroleum Association, fifty-second annual meeting, Traymore Hotel, Atlantic City, N. J.
16-17 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division, annual meeting, Roosevelt Hotel, New Orleans.
17 Natural Gasoline Association of America, Oklahoma regional meeting, Skirvin Hotel, Oklahoma City.
17-18 Kansas Geological Society, 1954 field conference, Rolla, Mo.; repeat trip September 24-25.
23-24 Western Petroleum Refiners Association, regional meeting, Henning Hotel, Casper, Wyo.
25-27 Diesel and Gas Engine Power Plant Operators Conference, sixth annual conference, Oklahoma A. & M. College, Stillwater, Okla.
27-28 Symposium on Methods for Testing Liquefied Petroleum Gases (ASTM D-2; ASTM D-3, CNGA & NGAA), Statler Hotel, St. Louis.
27-29 Electrical Conference for Petroleum Industry, American Institute of Electrical Engineers, Mayo Hotel, Tulsa.
27-30 Ninth Annual Petroleum Mechanical Engineering Conference, petroleum division of the American Society of Mechanical Engineers, Statler Hotel, Los Angeles.
28-29 Texas Mid-Continent Oil and Gas Association, Baker Hotel, Dallas, Tex.
30 Southern Gas Assoication, conference on transmission management, Shamrock Hotel, Houston.

OCTOBER

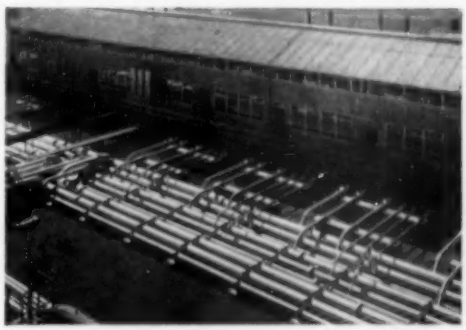
1 Southern Gas Association, conference on gas pipeline rights-of-way, Rice Hotel, Houston.
1-2 Standards Engineers Society, annual meeting, Haddon Hall, Atlantic City, N. J.
3-7 ASTM Committee D-2 on Petroleum Products and Lubricants, Sheraton Park Hotel, Washington, D. C.
4-6 Texas Mid-Continent Oil and Gas Association, annual meeting, Plaza Hotel, San Antonio, Tex.
4-6 Petroleum Electric Power Association, twenty-sixth anniversary meeting, Jung Hotel, New Orleans.
5-7 American Institute of Electrical Engineers, Middle Eastern district, Abraham Lincoln Hotel, Reading, Pa.
6-8 Eighteenth Technical Conference on Petroleum Production, Pennsylvania State University, State College, Pa.
7- 8 California Natural Gasoline Association, twenty-ninth annual fall meeting, Ambassador Hotel, Los Angeles.
7-8 American Institute of Mining and Metallurgical Engineers, Pacific Petroleum chapter, fall meeting, Biltmore Hotel, Los Angeles.
10-13 American Association of Oilwell Drilling Contractors, fourteenth annual meeting, Biltmore Hotel, Los Angeles.
10-16 Oil Progress Week.
11-13 American Gas Association, annual convention, Atlantic City, N. J.
12-15 American Chemical Society, national meeting, Chicago Coliseum, Chicago.

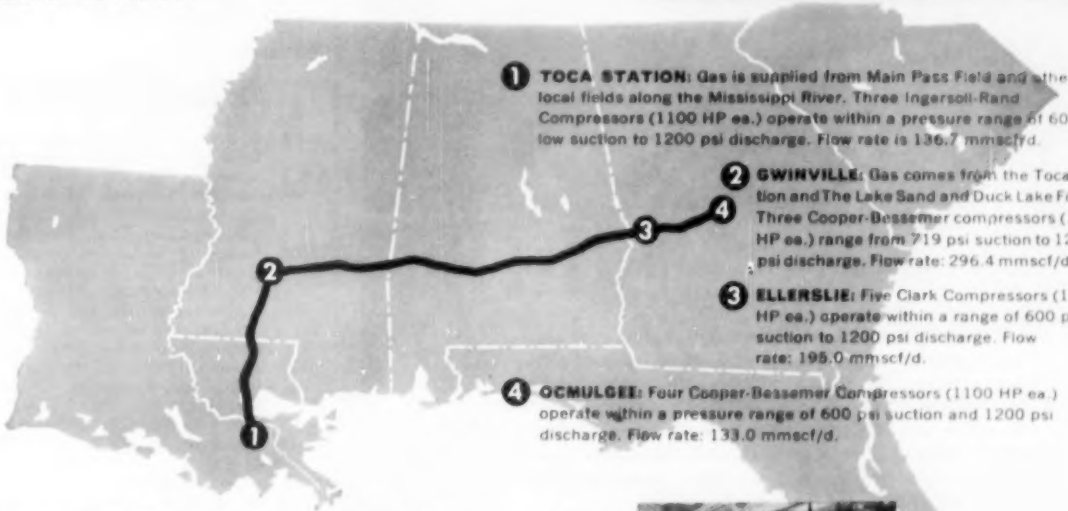
Designed to stop compressor-plant vibration–

Fluor pulsation dampener piping systems

have been installed by Southern Natural Gas in 4 new compressor stations

Southern Natural Gas Company has added four new compressor stations on their high pressure gas transmission system, which begins in Southern Louisiana and crosses the states of Mississippi, Alabama, Georgia, and extends into South Carolina. The company installed complete prefabricated Fluor Pulsation Dampening Systems in the four stations. A Fluor Pulsation Dampening Piping System had previously been installed at their Logansport, Louisiana, unit in 1952. Each new station has engines operating at a maximum of 1200 psi discharge under different conditions. The Fluor piping systems were individually designed, engineered and built into complete units to satisfy the specific conditions of each station.





1 TOCA STATION: Gas is supplied from Main Pass Field and other local fields along the Mississippi River. Three Ingersoll-Rand Compressors (1100 HP ea.) operate within a pressure range of 600 psi low suction to 1200 psi discharge. Flow rate is 136.7 mmscf/d.

2 GWINVILLE: Gas comes from the Toca station and The Lake Sand and Duck Lake Fields. Three Cooper-Bessemer compressors (1350 HP ea.) range from 719 psi suction to 1200 psi discharge. Flow rate: 296.4 mmscf/d.

3 ELLERSLIE: Five Clark Compressors (1100 HP ea.) operate within a range of 600 psi suction to 1200 psi discharge. Flow rate: 195.0 mmscf/d.

4 OCMULGEE: Four Cooper-Bessemer Compressors (1100 HP ea.) operate within a pressure range of 600 psi suction and 1200 psi discharge. Flow rate: 133.0 mmscf/d.

The Fluor Pulsation Dampener Piping System is the newest and most practical approach to pulse-free piping yet developed. Furnished in prefabricated form, ready for installation, it is built to eliminate pulse-peak pressures and piping vibration caused by reciprocating compressors, to provide a smooth, steady gas flow. Metering inaccuracies are significantly reduced, operating efficiency is increased, as is plant safety, and maintenance costs are cut to a minimum. Designed primarily for new construction, a Fluor Pulsation Dampener Piping System is comparable in first costs with conventional piping systems.

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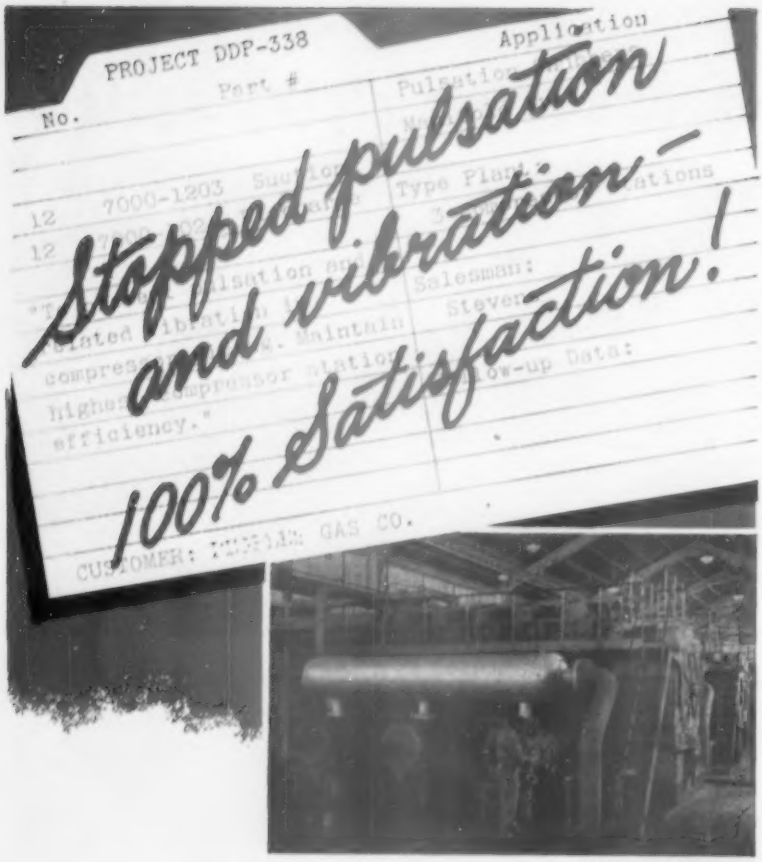
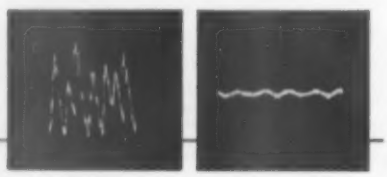
FOR MORE INFORMATION *on the full advantages of this guaranteed piping system, write for Bulletin PDS-8501.*



Burgess-Manning engineers studied the compressor specifications and proposed station operations and designed and built pulsation snubbers of suitable size and construction to satisfy the pulsation dampening requirements. Surveys conducted during actual operation showed that these snubbers effectively eliminate the problems of pipe vibration and maintain compressor efficiency. This control was satisfactory even though actual operating conditions of the compressors were at considerable variance with the initial design conditions . . . proof of Burgess-Manning flexibility.

Oscilloscope Traces recording pulsation on the compressor side of both suction and discharge snubber as compared to the piping side of pulsation snubber indicated effective elimination of the surge in the station piping, as indicated at the left. A smooth flow of gas was attained.



BURGESS-MANNING COMPANY

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DALLAS, TEXAS

Sound Engineering

LIBERTYVILLE, ILL.
CHICAGO, ILL.

12-15 Eighth National Chemical Exposition, Chicago Coliseum, Chicago.
14-15 National Association of Corrosion Engineers, South Central Region, Dallas.
14-17 Permian Basin Oil Show, Odessa, Tex.
17-20 American Institute of Mining and Metallurgical Engineers, petroleum division, fall meeting, Plaza Hotel, San Antonio.
18-19 Joint Lubrication Conference, American Society of Mechanical Engineers and American Society of Lubrication Engineers, Lord Baltimore Hotel, Baltimore.
21-22 Western Petroleum Refiners Association, regional meeting, Garrett Hotel, El Dorado, Ark.
21-23 Rocky Mountain Oil and Gas Association, annual meeting, Cosmopolitan Hotel, Denver.
22-24 Golden Trend Oil Exposition, County Fairs Building, Pauls Valley, Okla.
24-26 Independent Petroleum Association of America, annual membership meeting, Mayo Hotel, Tulsa.
25-27 National Lubricating Grease Institute, annual meeting, Mark Hopkins Hotel, San Francisco.
26-28 Society of Automotive Engineers, national diesel engine meeting, Statler Hotel, Cleveland.
29 Natural Gasoline Association of America, southern regional meeting, Blackstone Hotel, Tyler, Tex.

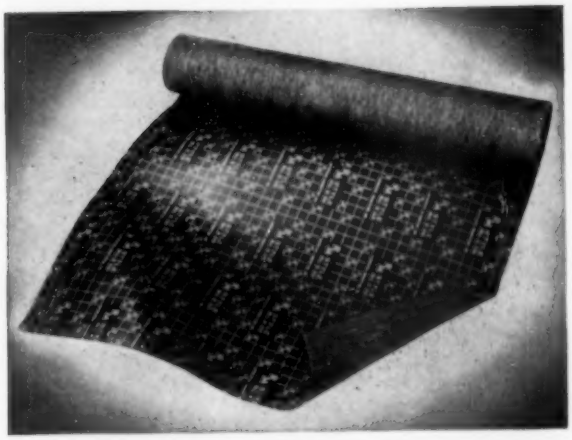
NOVEMBER

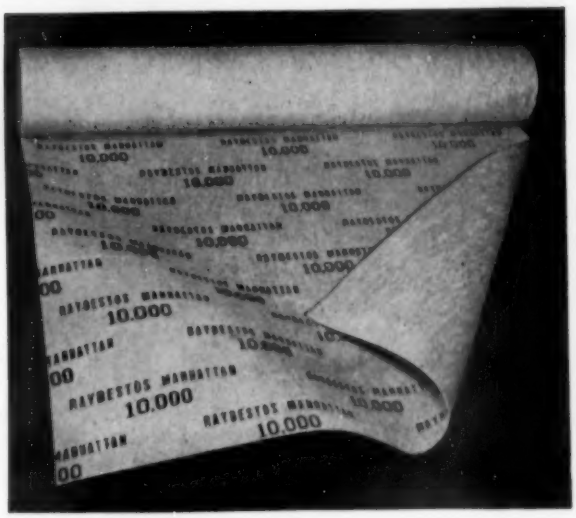
1-3 Geological Society of America, annual meeting, Statler Hotel, Los Angeles.
3-5 Gulf Coast Association of Geological Societies, fourth annual meeting, Rice Hotel, Houston.
4 American Association of Oilwell Drilling Contractors, third annual South Louisiana safety clinic, New Iberia, La.
4-5 Society of Automotive Engineers, national fuels and lubricants meeting, Mayo Hotel, Tulsa.
5 Southern Gas Association, conference on field production of natural gas, Herring Hotel, Amarillo.
3-11 American Petroleum Institute, thirty-fourth annual meeting, Conrad Hilton Hotel and Palmer House, Chicago
11-12 American Association of Petroleum Geologists, Pacific section annual meeting, Biltmore Hotel, Los Angeles.
17-18 North Texas Section, American Institute of Mining and Metallurgical Engineers, and Production Committee of the North Texas Oil and Gas Association, symposium on secondary recovery, Wichita Falls, Tex.
18-19 National Association of Corrosion Engineers, fourth annual conference of western region, Hotel Biltmore, Los Angeles.
18-19 Society of Exploration Geophysicists, eighth annual midwestern meeting, Adolphus Hotel, Dallas.
28-Dec. 3 American Society of Mechanical Engineers, Statler Hotel, New York.

DECEMBER

2-4 Interstate Oil Compact Commission, winter meeting, Drake Hotel, Chicago.
2-4 American Chemical Society, Southwest Regional meeting, Fort Worth, Tex.
3 Natural Gasoline Association of America, Panhandle-Plains regional meeting, Herring Hotel, Amarillo, Tex.
12-15 American Institute of Chemical Engineers, annual meeting, Statler Hotel, New York.

R/M K-68
and
R/M 10,000
are custom-built for oil service





These two compressed asbestos gasket sheets are outstanding examples of R/M's ability to meet the sealing needs of the petroleum industry.

R/M K-68 is a compressed sheet of specially selected asbestos fibers, bonded together under great pressure, with a binder that makes it highly resistant to petroleum oils at high temperatures. Its outstanding feature is its non-cold-flow characteristics. When immersed in oil, K-68 has a positive measured swell of less than 15%, and its tensile strength remains between 90 and 100% of the original value. It is recommended particularly for equipment handling light petroleum fractions at high temperatures.

R/M 10,000, developed for narrow flange gaskets serving under extra pressure, is also recommended for heat exchangers, condensers, and high-pressure stills. The tensile strength of this gasket is 10,000 psi. It is the strongest compressed asbestos sheet produced. It can be used where ordinary sheets will tear or blow out.

For complete information on all R/M packings and gaskets for oil field, pipeline and refinery service, see your authorized R/M distributor.

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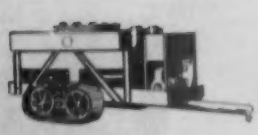
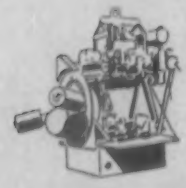
PIPELINE EQUIPMENT

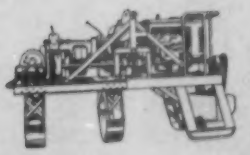


PIPELINE KETTLES



COATING & WRAPPING MACHINES

CLEANING & PRIMING MACHINES



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THE OIL AND GAS
JOURNAL

TULSA, OKLAHOMA

Published every Monday by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa, Oklahoma. Phone 3-6291. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

•

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JOURNALLY Speaking

Land of Not Quite

PARDON us while we tell about our vacation. We went to Mexico. Our first time there. Drove down and back. No trouble at all. Good roads, good accommodations, good service. Wonderful trip.

Mexico is often called the "Land of Mañana," meaning that things are often put off until tomorrow or the indefinite future. But we call it the "Land of Not Quite." Nothing is quite the same as it is anywhere else, no matter how generally similar. Nothing was quite what we expected. Everything seems to be not quite finished, not quite in repair, or not quite on time (except the bull fight). At first this is annoying to an American perfectionist, but one soon relaxes into the comfortable philosophy of making do with things as they are.

Mexico is as completely "foreign" a country as an American could find —markedly noticeable the minute the border is crossed. And yet so many things are so much like home. It's an intriguing, haunting, sometimes incongruous mixture, a fascinating blend of Old World and New. Mexicans take what they like—but only what they like—from other countries and meld it with their pre-Conquest heritage into a uniquely Mexican and most charming mode of life.

It is the Land of Mañana in many respects. There is the absence of pell-mell bustle to get everything done immediately, but at the same time the pervading feeling that Mexico is on the march, moving inexorably in its own way toward a great future. Mexicans are way ahead of us in some things (most conspicuously in architecture) but way behind us in others (such as insect screens), but a visitor soon stops making comparisons and begins to accept and respect things Mexican for what they are. It gives one a new perspective, makes one wonder whether we in the United States know all the answers, after all.

Being on a vacation, we kept strictly away from all contact with the Mexican petroleum industry except for filling stations and the extremely gracious and helpful Pemex Tourist Service. Yet just a short time in the country provided a background which gives us a much better understanding of what has—and what hasn't—happened in Mexican oil during the past couple of decades.

No Inglés

GETTING around in Mexico without any knowledge of Spanish is more amusing than it is difficult. Everyone who has anything to sell to the turistas Norteamericanos—and that includes practically everybody a tourist is apt to encounter—can make himself understood with the aid of a few English words and a lot of pointing and gesturing.

For instance, there was the evening we wanted to get the car serviced. Driving into a modern, well-equipped, and busy Pemex station, we asked the manager if he spoke English.

"No inglés," he replied.

We turned away mumbling that we were looking for a place that was open evenings.

"Wot you want?" he asked. "Wash, polish, no? Just change oil and grease job? Lubrication department close for la noche. Bring back 8 o'clock mañana. We do good job queeck. Take only one-half hora."

No English, but plenty of enterprising salesmanship and an ability to sense a customer's needs and to make himself understood.

It's like that all over. Another example is the classified ad we spotted in a Mexico City newspaper: "Madam —Mean While you atend your parties I care your children." Not quite grammatical, but entirely clear.

After a couple of weeks of conversing with people who knew no more English than we knew Spanish, and discovering how easy it is to convey ideas without benefit of formal language training, we about concluded that we had wasted a lifetime in trying to master the finer points of our complicated mother tongue.

—Henry D. Ralph.

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NOW! *an added "Range" for close tolerances.*

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. . . for easy starting in "slim" holes, without "snubbing."

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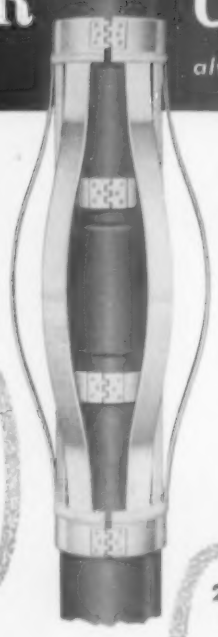

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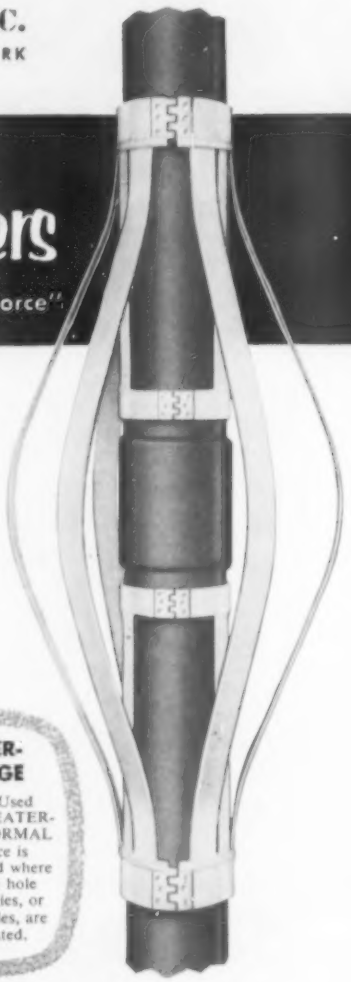
Used where LESS-THAN-NORMAL clearance is present between the casing ON which centralizers are run and the casing THROUGH which they are run.

25-RANGE
Used where NORMAL clearance is present, and no serious problem of over-size hole is anticipated.



SUPER-RANGE
"H-50" Used where GREATER-THAN-NORMAL clearance is present and where extensive hole irregularities, or even cavities, are anticipated.

Iran, the Rockies, and the rest of us

IT has always been a working principle of the oil industry that any new supply of crude is entitled to a share of the market, even if some older production has to move over a bit.

At the moment there are several potentially big new sources of crude seeking an outlet, and at a time when virtually the whole world has an adequate supply of oil.

The most prominent, from an international standpoint, is Iran, which soon will resume exporting after 3 years of inactivity. The assurances that Iranian oil will not come into the United States are undoubtedly sincere and presumably well founded, but to the extent that it displaces any other oil in any market it is bound to increase the world oversupply and make it that much harder for any crude to find ready buyers.

In the United States, the Rocky Mountain region is fast expanding its producing capacity and within a few months will have greatly enlarged transportation facilities to the Midwest. Inevitably much of this new oil will take over markets currently supplied by other sources, at least until over-all demand increases.

THERE IS LITTLE DISPOSITION in most quarters to deny this or other new oil a fair share of the market. But the producers who are faced with this competition do have a right to expect that this oil will abide by another working principle of the industry, namely, that new oil should come on the market in an orderly fashion and not stomp roughshod over the older producers.

The means by which this principle is applied is market-demand proration.

Within states which use it, proration limits output of new oil to volumes which will not cause premature abandonment of older fields, and thus avoids a chaotic, cutthroat condition. It is encouraging to the rest of the industry that the Rocky Mountain states which are preparing to market much more oil will seriously consider adopting proration laws next spring.

As among states, preservation of an orderly market depends on the mutual good faith and the individual actions of the various conservation authorities. In the international sphere it depends on the voluntary exercise of business judgment by a dozen or so private companies.

IF, BY ONE MEANS OR ANOTHER, new oil from any source adheres to the principle of proration to market demand, the rest of the industry will cooperate in letting it find a place in a market which everyone expects will expand in the near future. If not, the whole industry will be plunged into a series of bitter battles.

SANDFRAC

REJUVENATED PRODUCTION FROM 4 BOPD WELLS

Large-volume, high-injection-rate treatment performed by DOWELL increased flow from 4 to 213 BOPD

A well did not maintain its initial potential of 286 BOPD. In fact, at the end of a year and a half, its production was down to 4 BOPD.

In reworking the well, the operator called Dowell engineers who recommended a high-injection-rate Sandfrac* treatment using 20,000 gallons of special refined oil with 1½ pounds of sand per gallon. The treatment was performed at an injection rate of 28 barrels per minute.

Five months later, the well still tested 213 BOPD, flowing. And new oil produced as a result of the treatment totalled 7,433 barrels!

Other wells on which this same method has been used, have gone from 25 barrels or less per day to 100, 200 and 300 BOPD. Injection rates up to 60 barrels per minute have been attained.

Although operations on this scale are not a daily occurrence in every field, it is another example of the kind of service you can expect from Dowell. A call will bring experienced engineers to help you get maximum production. Telephone the nearest office, or write to DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. I-11.

**Sandfrac is a registered service mark of Dowell Incorporated.*

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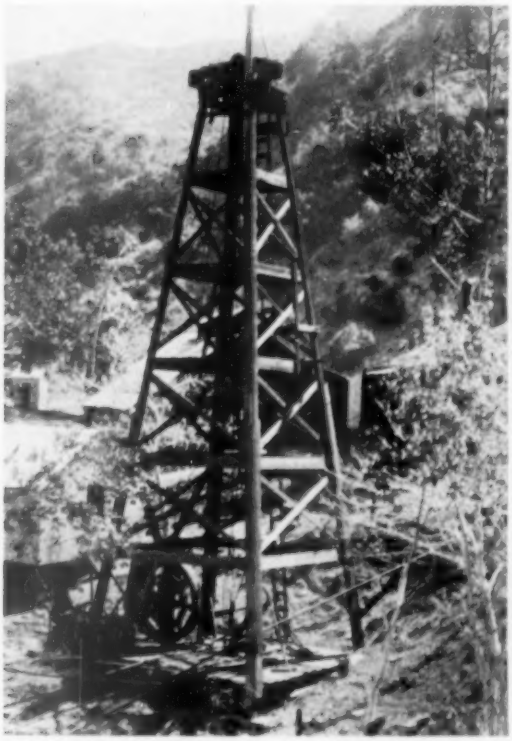
THIS WEEK... ...IN THE NEWS



GROWTH OF THE OIL INDUSTRY and growth of Standard Oil Co. of California have gone hand in hand almost from the start. Standard of California, observing its 75th anniversary this week, traces its origin back to the first commercially successful oil well in California, the Pico No. 4 (left), drilled by a predecessor to the present company. The well, which flowed 30 bbl. of oil per day, marked the birth of the petroleum industry in California. Early success of the company led to its global expansion until today it is represented in nearly every major oil-producing country of the world. Typical of its present operations is the deep offshore drilling in Galveston Bay (right) by one of its many wholly owned subsidiaries, Standard Oil Co. of Texas.

INDUSTRY—Five oil and gas associations enter Utah lawsuit before U. S. appeals court to defend pooling or unit clause commonly used in oil and gas leases. . . . ¶Sapphire Petroleums buys interest of Garnak Drilling Co. in 13,000 acres in Wyoming. . . . ¶Royalite Oil buys all assets of Hi-Way Refineries in western Canada. . . . ¶Continental converts 80,000-bbl. storage tank into "doughnut" research laboratory. . . .

STORAGE—Esso Standard pumps heating oil into abandoned slate quarry, marking first use of such a pit for off-season storage of middle distillates. . . . Project is first of several planned in same region of Pennsylvania only 65 miles from New York City. . . . ¶Gulf seeks permit to leach out its third cavity in Fannett field for storage of products from its Port Arthur refinery. . . .

INTERNATIONAL—West Australian Petroleum expands exploration program with plans for wildcats at Cape Range and Grant Range in northwestern Australia. . . . Rough Range test at a standstill with pipe stuck in the hole below 9,800 ft. . . . ¶Standard-Vacuum places India's first large refinery on stream at Bombay. . . . The 25,000-bbl. daily refinery beat its completion date by 6 months. . . . ¶Daily production in non-Communist countries outside United States rose 9.7 per cent in first 6 months of 1954. . . . First-half Free World production averaged 12,208,500 bbl. daily. . . . ¶Iranian oil operations slated to resume early in October. . . . ¶Caltex places first refinery in Philippines on stream. . . .

NATURAL GAS—Pure Oil Co. argues FPC cannot regulate natural gas until it leaves a field-processing plant. . . . Casing-head gas, because of impurities and liquids, is not a salable product and therefore not legally gas under the Natural Gas Act, Pure says in protesting Order 174-A. . . . ¶FPC expected to decide this week whether it will reconsider its controversial order. . . . Decision to reconsider could suspend matter until Supreme Court announces whether it will rehear the Phillips case. . . .

SECONDARY RECOVERY—World's first cycling plant, Chicago Corp.'s Wardner plant in Agua Dulce-Stratton field, still going strong despite doubts of skeptics who said idea would never work in 1938. . . . Originally processing 50,000 M.c.f. of gas and producing 800 bbl. of liquids daily, the plant now processes 165,000 M.c.f. and its liquid output is 3,000 bbl. daily. . . . ¶Carter Oil turns to sewage-plant discharge to supply water for Mattoon field water-flood expansion in Illinois. . . .

PONTOONS are clamped together by simple method after being lowered into water-filled pit by crane at rear.

ODD ROOF takes shape as more pontoons are fastened together. Overhang which provides seal has not yet been attached.

Latest idea in product storage . . .

. . . Esso Finishes Quarry Facility

WIND GAP, Pa.—Esso Standard Oil Co. last week began pumping heating oil into an abandoned slate quarry near here.

The million-barrel pit represents the first conversion of a mine or quarry to storage of middle distillates during the off season.

Esso has been studying the oil-storage potential of idle mines and quarries for several years. Last year the company took options on a number of slate quarries in this eastern Pennsylvania region only 65 miles from New York City.

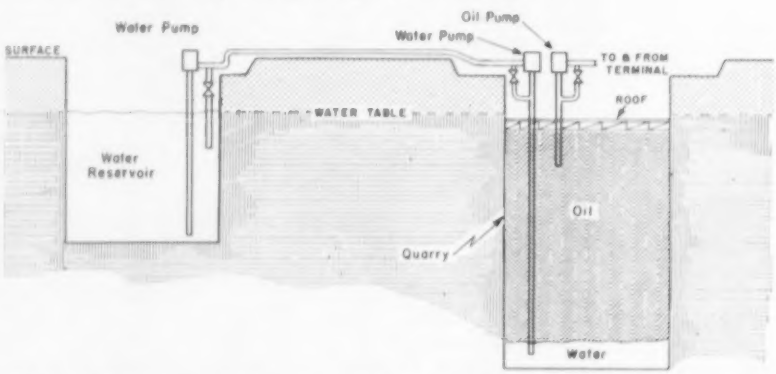
The options followed an intensive 18-month study into the feasibility of such a project *(The Oil and Gas Journal, July 6, 1953, page 42)*. Esso has kept options on nine of the quarries with a potential for storing 8,000,000 bbl. of products.

Conversion of this first pit, a $500,000 project, has been under way for the past year. The hole has a surface area of 56,000 sq. ft. and is 225 ft. deep at its deepest point. Burning oils will be moved in and out of the area by an existing 65-mile 6-in. line running within 1,500 ft. of the pit. Esso has leased the line.

Unusual roof . . . The quarry is covered with a flexible roof made up of 250 steel pontoon sections which float on the oil in storage.

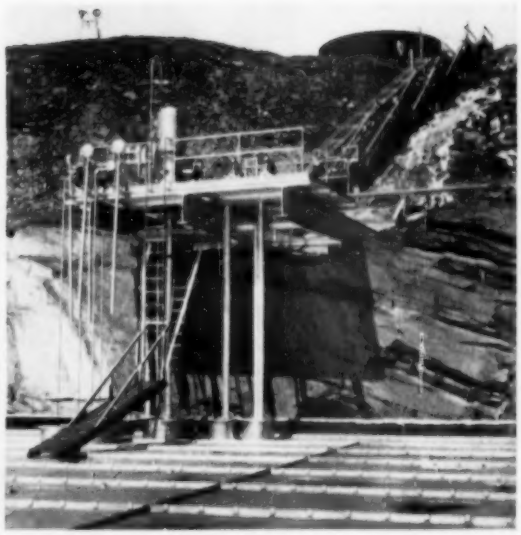
Each section weighs almost 3 tons. The pontoons are joined to form a seal which protects the oil from air borne

How Esso Will Operate Quarry Storage Pit



Products will be pumped in through pipe at right, with water being withdrawn through long pipe at the same rate. This would provide an almost constant liquid level. For product withdrawal, the procedure would be reversed. Esso engineers planned to keep the oil level below the level of the ground-water table. Thus the pressure of the formation water would always be higher than the liquid in the reservoir, preventing any leakage of products. Water seeping into the pit could be pumped out as desired.

FINISHED "TANK" with its contents protected from dust, sunlight, and animals. Neoprene curtain hangs from ledge around pit's sides to surface of pontoons.



PUMP PLATFORM where product and water enter the million-barrel pit. Ladder arrangement provides for 3-ft. rise or fall in height of roof.

contamination, wild life, and direct sunlight.

A 3-ft. shelf overhangs the quarry, covering the area between the roof and the quarry wall. From this shelf, which is attached to the sides of the pit, is suspended a neoprene curtain which extends vertically to the surface of the roof and forms a seal around the edges of the quarry. The curtain is about 3 ft. high, permitting that much vertical movement of the pontoon roof.

Actually, the level of oil and water in the pit will be controlled to permit very little vertical movement of the pontoon sections.

Two pits are employed in the storage project. One is used as a reservoir for displacement water. As burning oil is pumped to the storage pit, water which underlies the oil is withdrawn at the same flow rate. During the heating oil season when withdrawals begin the water will be returned to maintain a constant head on the pit.

Oil-input rate under full operating conditions can reach 6,000 bbl. per day, and the oil can be withdrawn at a rate of 8,000 bbl. per day.

Economics . . . Modification of the first quarry cost Esso about 50 cents per barrel of storage capacity, as compared with $2 a barrel for conventional steel storage tanks.

Even including a 7 to 10-cent cost for moving each barrel of product to and from storage, the project looks quite attractive to the Esso people.

Esso thinks it may take a full year of operation before it can determine the actual economics of the new-type storage facility. Steel requirements were 10 per cent of conventional surface-storage requirements. Maintenance, depreciation, and damage costs are expected to be exceptionally low.

"Successful demonstration of the feasibility of this type of storage may be the solution to the industry's seasonal storage problem," said H. G. Mangelsdorf, Esso's general manager of manufacturing.

The ability to put into dead storage large quantities of heating oil produced in the slack summer months could reduce the seasonal swings in production and transportation, he added.

Esso's studies, he said, have revealed many mines and quarries which could be used for this purpose.

Heating oils will be pumped from the Bayway refinery throughout the summer months, relieving refinery tankage for storage of gasoline and other products. With the advent of the heating-oil season, pipeline withdrawals from the reservoir will supplement current refinery production for tanker, barge, and truck delivery along the East Coast.

Walter Kidde Co., Belleville, N. J., was in charge of construction. Pontoon sections were designed and installed by Hammond Iron Works, Warren, Pa.

OPERATING SYSTEM, photographed after finishing touches had been added. Regardless of volume of heating oils, height of floating roof will not vary more than 3 ft.

More Firms Protest Gas Order

- **Pure contends no casing-head gas should be subject to FPC jurisdiction since it isn't a salable commodity**
- **Escalator and favored-nation clauses defended in briefs filed by Gulf and Skelly; action expected soon**

Henry D. Ralph

CASING-HEAD gas isn't legally "gas" until it has been "manufactured" in a processing plant, and therefore it cannot be regulated by the Federal Power Commission.

That is the position taken by some oil companies in fighting FPC's Order 174-A which attempts to impose federal regulation on independent gas producers all the way back to the well head.

The petition for reconsideration of the order filed by Pure Oil Co., among others, goes into considerable detail on this point. Should this position be sustained, either by FPC or by the courts, all sales of casing-head gas would be exempt from the Natural Gas Act even though the gas ultimately moves in interstate commerce.

Pure's line of argument is that casing-head gas (and all other wet gas for that matter) is not a merchantable commodity as it comes from the wells because it contains liquid hydrocarbons, water, and often other impurities which must be removed before it is acceptable for interstate commerce or before it is even physically capable of being transported in interstate commerce.

Therefore, it is contended, the material is not "natural gas" as that term is defined in the Natural Gas Act until it has gone through a natural-gasoline plant or other processing facilities—"manufacturing" is the term used by Pure.

Where a producer sells gas on the intake side of a processing plant and has no control over the disposition of the residue gas, Pure argues, the sale is actually and legally in intrastate commerce, its production and gathering are an incident to local business, and all facilities used are part of production and gathering rather than of interstate commerce.

Offshore problem . . . What about offshore production? Pure asks FPC, pointing to its own situation in Eugene Island and Rollover fields.

Very wet gas is produced in those offshore fields and is processed on the well platforms to remove the water which would make it physically impossible to transport it to shore. Liquid hydrocarbons are removed at the same time but these are put back into the gas stream for transportation to an onshore station where the liquids are removed a second time.

Pure transfers title to the dry gas at the offshore platform but retains title to the liquids, even though both are transported through the same pipeline as far as the second separation plant. The company argues that this is a "local incident" to production and gathering and is not part of interstate commerce.

Standard gasoline contracts . . . A slightly different approach to the problem of casing-head gas is being taken by attorneys for other producing companies. They believe that the FPC should amend the order to exempt all gas sold in the field under standard casing-head-gasoline contracts.

Under these standard contracts, which are almost universal in the Southwest and Mid-Continent, an oil producer sells wet gas in the field to a natural-gasoline plant and is given a specific price for the liquid products made from it. However, the producer has no control whatever over the disposition of the residue gas except that if the plant sells it the producer will get a certain portion of the price, whatever that may be.

It is argued that it would be meaningless for producers to file these standard casing-head-gasoline contracts with the FPC because they do not constitute "rates", no price figure is given, and the producer has no say as to the ultimate price or even as to whether the gas is marketed at all.

A blanket exemption of such "no price figure" contracts from Order 174-A would automatically remove thousands of independent producers from regulation by FPC.

Escalator clauses . . . A common target of most of the petitions being filed with FPC is the provision in Order 174-A prohibiting the operation of "escalator" and "favored nation" clauses of gas contracts.

Gulf Oil Corp., for instance, argues earnestly that if contracts of producers are to be their rate schedules, then FPC must consider them in their entirety and not look only at a particular portion or installment that happens to be in effect on an arbitrary date.

The "freeze date" of June 7 might be the first year of one producer's sliding-scale contract and the tenth year of another's, Gulf points out, arguing that this is not only unfair but is illegal because it does not use a reasonable standard as the basis for rate regulation.

Pure's brief explains that escalator clauses are made for the purpose of assuring the producer a return on his investment and to bring about proper

FPC Decision on Order Expected Soon

WASHINGTON.—The Federal Power Commission is expected to disclose this week whether it will reconsider Order No. 174-A, which places independent producers and gatherers of natural gas under federal regulation.

A decision on acceptance of the first of a score of petitions for reconsideration filed last month is due by September 11.

FPC rules provide that if no action is taken on such petitions within 30 days they are presumed to be rejected. September 11 marks the end of the 30-day period on Ohio Oil Co.'s petition, the first to be filed.

The commission can move in one of three directions—agree to rehear the order, refuse to reconsider the order, or ignore the petitions, which would automatically mean their rejection. In view of the importance of the issue, however, it is not expected that the commission will ignore the matter.

Reconsideration of the order would enable the FPC to hold the matter in abeyance until the Supreme Court meets next month and announces whether it will rehear the Phillips case.

If the commission stands pat on its order it is expected that some of the companies now seeking rehearing will go to the courts in an effort to force reconsideration if the Supreme Court also refuses to take another look at the problem.

and orderly development of gas reserves and producing facilities. To attempt to strike them down without a hearing on their feasibility, it says, will not encourage the search for gas, its production, nor its conservation.

Favored-nation clauses, Pure points out, are simply a device to provide producers with a fair average field price and are an aid to gas development and conservation. As such, the brief insists, they are not a part of interstate commerce but are local incidents to production and gathering.

Leases canceled? . . . Skelly Oil Co. takes an even more advanced stand on favored-nation clauses.

Its brief declares that their purpose is to satisfy the covenant in the lease with the landowner requiring the producer to diligently market all gas produced. If these clauses are knocked out, Skelly says, landowners may cancel the leases on the ground that the gas is not being sold at a price as high as other gas in the same field.

Skelly and others also argue that the various types of step-up clauses in long-term contracts are not legally "rate changes" within the meaning of the Natural Gas Act. They also contend that since such contracts were all filed with FPC by interstate transmission companies and allowed to go into effect without objection, FPC has no right to abrogate them now.

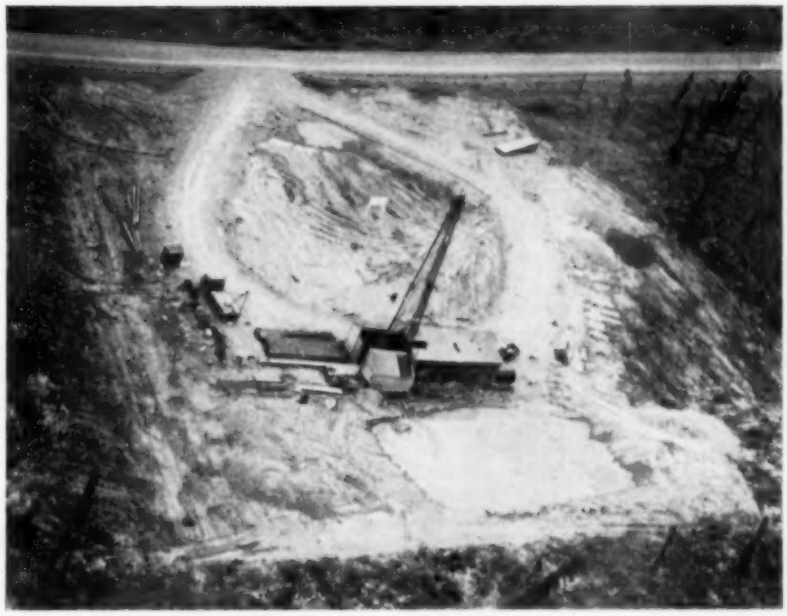
The facts of gas . . . The FPC order ignores the facts of gas production and the nature of reservoir behavior and depletion and disregards the principles of conservation and correlative rights, Skelly Oil Co. asserts in its petition.

This thought is reflected, in one way or another, in most of the petitions. The protests are directed at the "change of service" provision of Order 174-A which prohibits reducing deliveries of gas below the level of June 7 production.

The companies point out that the rate of gas production is affected by many factors beyond their control, particularly state conservation orders which regulate the volume of oil production. They all insist that this is beyond the reach of FPC because it is part of production and gathering which the Supreme Court expressly said was reserved to state control.

A specific example of this is described in Pure Oil Co.'s brief. Within the last 2 weeks Pure has completed a new well in Upton County, Texas, which is subject to drainage by another well unless it is immediately connected to a gas line.

However, under the FPC order, Pure must file an application for a certificate which is subject to a hearing and a delay of 30 days or more. During this delay, Pure says, it will suffer irreparable loss through drainage and is in danger of having the lease canceled for failure to market the gas.



Oil Shows Found in Alaskan Wildcat

Alaska Oil & Gas Development Co., Anchorage, has encountered several oil shows in its rank wildcat in Southeast Alaska. A small show of gas was encountered at about 700 ft. and oil shows were found at approximately 1,200 ft. and between 1,665 and 1,880 ft., according to William A. O'Neill, secretary-treasurer of the firm. The strongest show was at approximately 1,740 ft., where there was a thin layer of sand in the shale. The cable-tool test has reached the 2,365-ft. level, in Cretaceous shale. The well is 300 ft. off the Glenn Highway, shown in the aerial view above, and is on the largest of three blocks totaling 78,058 acres held by the company in the Eureka-Nelchina area, about 125 miles northeast of Anchorage.

Not public utilities . . . Practically all the companies filing petitions flatly deny that they are engaged in interstate commerce or that their sales of gas are similar to those of Phillips Petroleum Co. which were under consideration by the Supreme Court.

They insist that all their facilities are incident to the production of oil and that FPC has no right to assume otherwise without a hearing as to the facts.

Gulf Oil Corp., for instance, explains that it has no characteristics of a public utility because it does not have and cannot have any exclusive franchises, there is no limitation or exclusion of competition, and no guarantees of a fair return on its investment. In the absence of these features, it argues, FPC has no legal right to treat Gulf as a public utility.

Along the same line, Stanolind Oil & Gas Co. declares that field sales do not constitute a dedication of the gas to public use, nor the facilities necessary to effectuate the sales. Stanolind says in most of its fields it has more gas than is covered by its present sales contracts and the company is consistently unwilling to commit this gas to the performance of its contracts.

Mutual mistake . . . A number of legal grounds are cited in the various petitions to support the industry's argument that producers have acted in good faith in assuming that they were not "natural gas companies" under the law and that therefore they have the right to elect whether or not to become so.

Stanolind, for example, while denying that its operations are subject to FPC jurisdiction, says that even if it is determined that some of its activities are in interstate commerce this is due to a "mutual mistake of law to which the FPC was a party." Not having knowingly embarked in a regulated business, Stanolind says, upon discovery of the mistake a company should have the right to elect whether to continue or cease that business.

Too little time . . . The vagueness of the FPC order is another common complaint. Most of the petitions state that the producers have no knowledge of what happens to their gas after they sell it and are unable to determine whether or not certain of it goes into interstate commerce. Many companies

state that while they are diligently attempting to assemble the information, it will be impossible for them to file all the required data by the deadline of October 1.

In spite of the difficulties in complying with the filing requirements, it is expected that virtually all of the big producers will make at least partial or pro forma filings by October 1, though some companies admit that they will not be able to include all the details in their original filings. However, most of them will file under formal protest to make the record show that they are not admitting that they are in interstate commerce and are not voluntarily becoming public utilities.

Phillips protests . . . Phillips Petroleum Co. filed 46 applications for approval to sell gas in Texas, together with applications for rate changes in about 250 contracts to reflect the increase in the Texas gas tax which went into effect September 1. Phillips did this under protest, insisting that these contracts are not subject to federal control and that the filings were made only to avoid penalty under Order 174-A until the question can be adjudicated.

Except for Phillips, only about 20 small producers of the 3,000 or 4,000 covered by the order have made the required filings with FPC, which suggests that the commission will be buried in an avalanche of paper on October 1.

At least 40 producers, mostly big oil companies, have filed petitions for rehearing, modification, and postponement of Order 174-A, and more are known to be in preparation. FPC rules provide that if no action is taken on such petitions within 30 days they are presumed to be rejected.

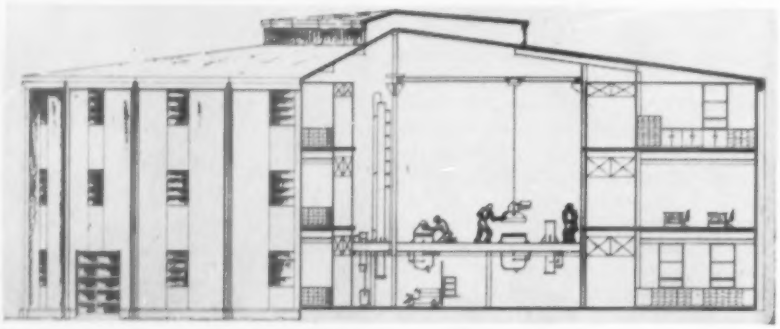
Penn Crude Prices Slip

BRADFORD, Pa.—Field prices for some grades of Pennsylvania crude were cut from 3 to 5 cents a barrel as of September 1 to maintain competitive prices at refineries in the Middle District.

The Joseph Seep Purchasing Agency of South Penn Oil Co. cut Bradford grade 3 cents a barrel to $3.23, Middle District by 5 cents to $3.15 and West Virginia crude by 5 cents to $2.70. Southwest Pennsylvania crude remained at $2.81.

Quaker State Oil Refining Corp. reported no change in the price of Buckeye crude.

Pipeline companies serving the Pennsylvania Grade area have made some changes in transportation charges and these increases are reflected in the slight reductions in field prices. Since the various grades of crudes from the different producing districts are exchanged freely in the Middle District refining area, the delivered prices must be strictly competitive.



Conoco Oil Tank Becomes . . .

. . . "Doughnut" Petrochem Lab

PONCA CITY, Okla.—An 80,000-bbl. oil-storage tank is being converted into a modern, doughnut-shaped research laboratory at the Continental Oil Co. refinery here.

The three-story structure, costing half a million dollars, is scheduled for completion early next year, according to Harold G. Osborn, Conoco vice president.

It will house pilot-plant facilities for exploring the commercial feasibility of manufacturing petrochemicals already developed by Conoco's research-laboratory staff.

Sixty additional scientists and research workers will be moved to Ponca City to staff the new laboratory.

The "hole in the doughnut" will extend through the center of the building, from ground level to roof. Unlike its counterpart in the pastry world, however, this central space will have a specific use. It will contain a travel hoist suspended from the ceiling to handle pilot-plant equipment and experimental apparatus.

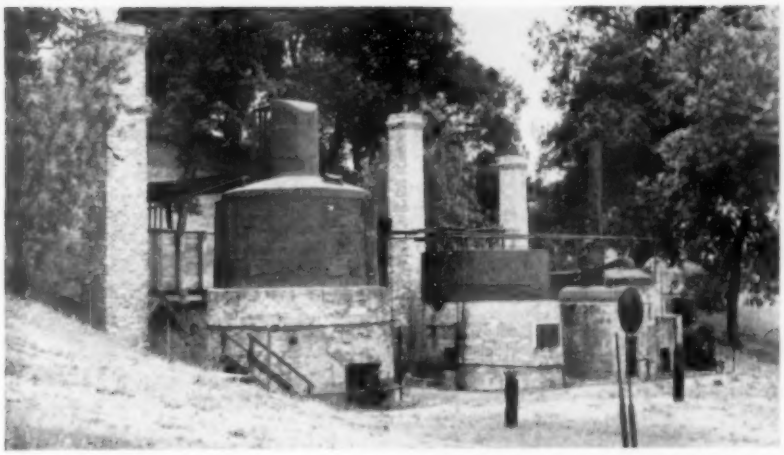
Offices, laboratories, and conference rooms will be built around the opening, each facing the well area. Total floor space will be 33,000 sq. ft.

Windows and a main entrance will be cut into the outer wall of the oval structure. The building will be fully insulated and air-conditioned. Its exterior will be finished with aluminum paint.

Osborn said the unusual design was considered "fantastic when it was first suggested," but that closer study of plans indicated it would be practical for research operations.

Construction of the new research building added weight to reports that Conoco's research headquarters would remain in Ponca City, although many employes in divisions other than refining have been transferred to Houston.

The company is constructing a 21-story office building in Houston and recently announced that about 90 employes in the marketing division will be transferred there from Ponca City.



FIRST REFINERY in California consisted of these simple stills at Newhall, built in 1876 by a predecessor of today's Standard Oil Co. of California. The refinery, restored in recent years, had a capacity of 22,000 bbl. per year and produced mostly kerosine and grease.

GROWTH of Standard of California during its 75-year history is exemplified by this view of its huge refinery at Richmond. With a crude capacity of 181,500 bbl. per day, it is the largest refinery on the West Coast. More than 1,000 products are manufactured at the six major United States refineries operated by Standard of California and its subsidiaries.

Standard of California . . .

. . . Still Growing at 75

SAN FRANCISCO. — Standard Oil Co. of California will observe its seventy-fifth birthday this week, but its outlook is more that of a teenager.

Known by its present name only since 1926, the company dates its corporate history from September 9, 1879. That was the day a group of California oil pioneers formed Pacific Coast Oil Co., an infant which was to develop through the years into the husky firm of today.

The company proudly traces its family tree even farther back—to the drilling of California's first successful oil well and the construction of California's first oil refinery.

Pacific Coast Oil Co. was founded by a handful of businessmen with a capitalization of about $1,000,000. Net worth of the present company is more than $1,400,000,000 or 1,400 times the original value.

More growth planned . . . Although it ranks as one of the world's largest oil companies, Standard of California is looking to the future rather than the past.

The 1954 spending program, exceeding last year's by about $50,000,000, calls for expenditure of some $175,000,000 in search for new oil reserves and development of proven fields.

The company's rapid and continuing growth is not accidental. T. S. Petersen, company president who has been associated with the firm since 1922, attributes its unusual success largely to "the healthy economic climate of the West," but it takes more than a good climate to produce giants.

Its research department has been a major factor in the company's growth. Through research, Standard of California, like other major oil companies, has discovered new frontiers as quickly as it has conquered old ones.

Horizons broadened . . . The company's quest for new oil fields has led from the narrow confines of Pico Canyon, site of California's first commercially successful oil well, to virtually all the major producing areas of the United States and to Canada, Venezuela, and the Middle East.

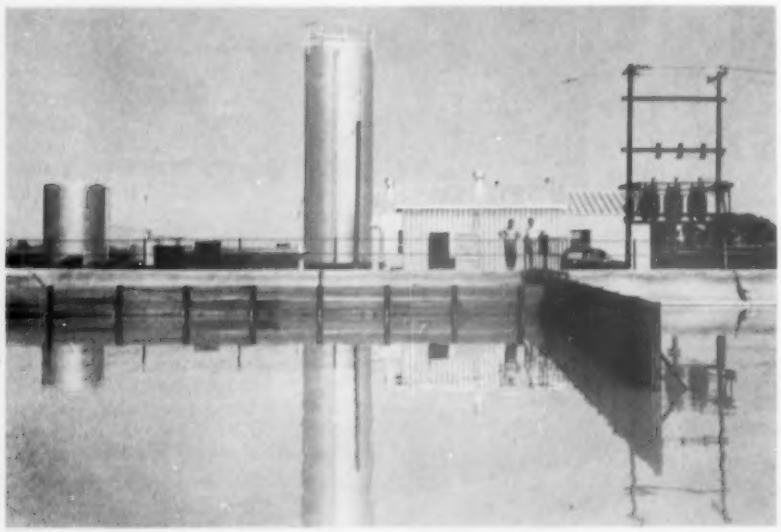
It is now one of the four largest producers of crude oil in the United States. Along with its subsidiaries, it produced more than 300,000 bbl. daily in this country last year, in addition to more than 30,000 bbl. per day elsewhere in the Western Hemisphere.

Its production outlook for years to come is brightened by the company's extraordinary drilling record. In 1953, the parent company and its wholly owned subsidiaries drilled 569 wells, of which 456 produced oil or gas. Twenty-eight of their 104 exploratory ventures were successful.

Chronology . . . One of Pacific Coast Oil Co.'s first corporate acts was the acquisition in 1879 of California Star Oil Works Co., the organization which 3 years earlier helped develop California's first commercial oil field at Pico Canyon and built the state's first refinery at nearby Newhall.

Pacific Coast Oil later was purchased by the Standard Oil interests and in 1906 it was merged with another Rockefeller company, Standard Oil Co. (Iowa), to form Standard Oil Co. (California). The latter firm became an independent company when the vast Standard Oil interests were broken up following the famous Supreme Court decree of 1911. It dropped the parentheses from its name in 1926, when it was reorganized as Standard Oil Co. of California.

Dry Reservoir Makes Carter . . .



. . . Try Unusual Water Supply

MATTOON, Ill.—The summer drouth in Illinois almost forced Carter Oil Co. to postpone its plans for expanding its water flood in Mattoon field.

The company had enough water to continue its 2-year-old pilot flood but there wasn't enough for additional injection wells. Water for the pilot flood was obtained from salt-water wells to the Devonian and Pennsylvanian.

Lack of rain and a hot summer had drained Mattoon's reservoir. The city had turned to fresh-water wells to tide it over. There was no surplus for oilfield operations.

Carter solved the problem by contracting to buy Mattoon's sewage-plant discharge.

Carter laid a 3½ mile, 8-in. line from the sewage plant to its injection area and built its own treating plant to process the effluent and reclaim the water. The plant first injects chlorine to kill bacteria, algae, and the odor then settles out the solids in a slush tank. The water is then rechlorinated and pumped through two filters. The filters remove the dead algae and bacteria and any remaining suspended matter which might clog the face of the producing formation.

The water supply enabled the company to begin expanding its flood. There are now 12 input wells on 20-acre spacing. The 240 acres being flooded will eventually be expanded to 1,000—with a profitable payoff expected from the novel "sewage" flood.

United Geophysical Sold

LOS ANGELES.—A group of United Geophysical Company, Inc., employes headed by C. C. Lister, president, and E. A. Pielemeier has bought the company from Union Oil Co. of California.

Union Oil, which bought the company in 1950, said that the sale was in line with its policy of encouraging and aiding the growth of independent businesses.

The geophysical company was originally founded by Herbert Hoover, Jr., who resigned as chairman of the board after the sale to take his new position as Undersecretary of State.

Firm Acquires Properties

OKLAHOMA CITY.—Gibraltar Oil Co., a newly formed independent producing company, has acquired all producing and non-producing properties of William R. Whittaker Co., Ltd., and Majorol Oil Co.

The price of the transaction was not disclosed. The properties are located in Oklahoma, Texas, Louisiana, Arkansas, California, Nevada, Utah, Wyoming, Colorado, Nebraska, Arizona, and New Mexico.

R. M. Vandergrift, president of Gibraltar, said that all employes of the two acquired firms would be kept and that the firm's general offices would be located here.

Natural-Gas Briefs

COLUMBUS, Ohio.—Ohio Fuel Gas Co. has completed a $296,000 project and announced plans for one costing more than $500,000. H. L. Gentry Construction Co. of Jackson, Mich., has finished laying 8 miles of 16-in. transmission line to deliver larger quantities of gas to Norwalk, Milan, Monroeville, Bellevue, Clyde, and Fremont, Ohio. Shamrock Construction Co. of Lansing, Mich., will lay the other job which will consist of 7 miles of 24-in. line and a new pressure regulating station.

HOUSTON. — Transcontinental Gas Pipe Line Corp. has been notified that hearings will be reopened October 4 in Washington on the company's proposal to gain acess to additional natural-gas reserves in Orange, Chambers, and Jefferson counties, Texas.

FLORENCE, Ala. — Alabama-Tennessee Natural Gas Co. has proposed to add 25 miles of 8 and 12-in. pipeline and a 350-hp. compressor station to its facilities in Alabama and Mississippi.

Switch Opposed

Little Inch proposal hit by potential competitors

WASHINGTON.—The proposal to convert the Little Inch pipeline from a natural-gas to a petroleum-products carrier drew opposition last week from two sources—American Pipe Line Corp., which plans to build a competing line, and a group of Mississippi River barge operators.

Both organizations filed petitions with the Federal Power Commission for leave to intervene in the case in which Texas Eastern Transmission Corp. seeks authority to convert the line.

Conversion of the Little Inch would contravene the antitrust laws, charged Harold Leventhal, attorney for the river-transportation interests, in a petition filed with the FPC. Leventhal represents River Co., Inc., and Cotin Towing Corp., both of New Orleans, and Greenville Towing Co., Inc., of Greenville, Miss.

American Pipe Line alleged the Little Inch line, with a maximum capacity of 235,000 bbl. per day, would be inadequate for national-defense purposes. American's proposed 1,445-mile products line from Beaumont, Tex., to Newark, N. J., would have a maximum capacity of 500,000 bbl. per day.

American officials also point out that the Texas Eastern line would not be converted beyond Pittsburgh and that it is not considered adequate to handle L.P.G. Revised plans for the American Pipe Line system call for thicker walls and heavier pumping equipment to make it suitable for transmission of L.P.G. The system, in addition to 1,445 miles of main line, would include 500 miles of feeder and distribution spurs.

Earlier protest . . . The barge operators' petition to the FPC was the second step in their fight against the substitution of pipeline for river transportation.

The same companies filed a complaint against Texas Eastern in District Federal Court for Southern New York May 21. They alleged then that conversion of the Little Inch would infringe on the transportation business from the Texas-Louisiana-Arkansas refinery area to the middle Mississippi and Ohio River Valleys.

In their FPC petition, they charged Texas Eastern's plan would constitute an attempt to monopolize the transportation markets and would be in restraint of trade.

It also was alleged that the proposed operation "would not yield the income on the Little Inch as a product pipeline indicated by Texas Eastern in its application."

The protestants contended the conversion "would launch Texas Eastern into a new, highly speculative venture" and would reduce the company's rate of return on its investment.

Asphalt Runways Get Nod

WASHINGTON. — The Air Force has offered an expanded market to asphalt producers by suspending the payment of a 5 per cent premium for concrete runways in noncritical areas of airfields.

The action was disclosed last week by a House armed services subcommittee in a supplemental report on an investigation made during the last session of Congress into practices of military agencies.

The investigation raised the question whether the higher-cost concrete paving was necessary in runways not used by heavy traffic. John M. Ferry, head of Air Force installations, told Subcommittee Chairman William E. Hess of Ohio that concrete is considered superior to a combination of asphalt and concrete in runways but that his department has been unable to collect adequate engineering data to support that belief.

"That same conclusion was reached by the subcommittee after a full and open hearing on the subject in May of this year," Hess stated.

Oil-Shale Policy Coming

WASHINGTON.—Whether the Government's oil-shale plant at Rifle, Colo., continues operating may be determined shortly by oil-industry representatives.

A National Petroleum Council committee headed by B. A. Hardey, Shreveport independent, is making a study and is expected within the month to recommend a policy to be followed in handling the Rifle plant.

The NPC study was requested by the Interior Department after a committee surveying the Bureau of Mines' experimental work at Rifle recommended that it be discontinued unless there is "a substantial contribution by industry under a cooperative agreement."

Department officials already have had a number of talks with companies interested in shale-oil development as to the possibilities of selling the plant or turning it into a joint government-industry project through either an operating or cooperative agreement.

Oil Suits Prepared

WASHINGTON.—One-sixth of the personnel of the Justice Department's antitrust division is working on petroleum cases, Asst. Atty. Gen. Stanley N. Barnes disclosed last week.

The three biggest tasks are the screening of thousands of documents involved in the Government's pending cartel suit in New York, preparation for the big West Coast divorcement case pending since 1950 and arranging for the Sun Oil Co. case soon to come up in Philadelphia.

Department officials are seriously concerned over the recent increase in mergers of big corporations, Barnes said. Statistics indicate that the number of corporate mergers generally has declined, but the number of multimillion dollar amalgamations has increased. Barnes gave no indication whether any proposed mergers in the oil industry are under study.

Barnes said the department is looking for a suitable court test of the 1950 Layton Act amendment prohibiting mergers through the acquisition of physical assets where the effect may be to lessen competition or tend to create monopoly.

Senators Schedule Jaunt

WASHINGTON.—Members of the Senate interior subcommittee on minerals, materials and fuels economics plan to visit Latin America in November for a first-hand study of the availability of wartime strategic and critical materials.

The group, headed by Sen. Guy Cordon of Oregon, plans a 7-week tour which will cover Venezuela, Brazil, Argentina, Chile, Peru, Bolivia, Ecuador, Colombia, Mexico, Panama, Cuba and Jamaica.

The senators plan to make inspections of producing facilities and to hold conferences with production experts and government officials. The party will leave Miami November 5 and return to Houston, December 23.

Meanwhile, the President's Cabinet Committee on Energy Supplies and Resources is planning its organizational set-up, including a petroleum consultant and a task force to study oil prob-

lems. The committee has 3 months in which to develop recommendations to the President for a national fuels policy.

Tanker Bids Invited

WASHINGTON.—Bids for construction of four high-speed "super" tankers for the Military Sea Transportation Service have been invited by the Maritime Administration, acting as construction agent for the Navy.

The four vessels will represent the Government's share of the MSTS program to replace a large number of present wartime tankers with 20 new vessels, 15 of which are to be built by private interests and used by the Navy on 10-year charters.

The plan originally called for the building of 5 ships by the Navy at a cost of $37,500,000 but Congress appropriated only $30,000,000, necessitating the dropping of one tanker.

In asking for bids, the Maritime Administration disclosed the basic characteristics required: The tankers are to be 640 ft. in over-all length, 84 ft. in breadth and 32 ft. draft, 25,000 deadweight tons with a cargo capacity of 231,825 bbl. and a normal sea speed of 18 knots.

Maritime officials estimate that the MSTS tanker-building and charter program will generate $150,000,000 in contracts for American shipyards.

Pipeline Rule Added

WASHINGTON. — The Bureau of Land Management added a new requirement last week to its regulations governing the grant of pipeline rights-of-way through public lands and reservations.

The bureau announced that in the future the approval of such right-of-ways will be subject to the express conditions that the use of the pipeline for the transportation of oil, gas or other similar products shall be limited "to such products produced in conformity with state and federal laws, including laws prohibiting waste."

Boone Dome Sale Set

WASHINGTON.—Oil and gas leases on nine parcels of land in the known geologic structure of Boone Dome field in Natrona County, 36 miles northwest of Casper, Wyo., will be sold to the qualified bidder of the highest cash bonus September 15 by the Bureau of Land Management.

A total of 1,480 acres is included in the parcels, which range from 80 to 240 acres in size. The usual rental and royalty terms will apply to the leases.

WATCHING WASHINGTON

Bertram F. Linz

L.P.G. Forging Ahead

Liquefied petroleum gas is rapidly approaching the stature of a major fuel directly competitive with oil.

Only a few years ago used principally for blending in motor gasoline and as bottled gas for cooking in rural homes, L.P.G. almost doubled its market since 1949.

Butane, propane and their mixtures are building up large new markets as tractor, bus and truck fuel. They are being used extensively in drilling and pumping units and internal combustion engines for other uses. As fuel for space heating, they are principally good for tobacco curing, chicken hatcheries and other places where close temperature control is vital.

There is evidence that the railroads also are interested in the possibilities of L.P.G. as engine fuel. The Union Pacific now is experimenting with a modified diesel engine, equipped with a pressure tank which initial tests indicate is highly economical.

Meanwhile, L.P.G. producers are seeking to increase consumption because of current heavy over-supplies, with every prospect that they can attain an even greater share of the liquid-fuel market as time goes on.

Turbine Experiments Set

The Maritime Administration is experimenting with turbine propulsion to modernize the mothballed 1,500-vessel Liberty reserve fleet.

The reciprocating steam engines in two vessels are to be torn out, and turbine units installed. One ship will get a steam turbine power plant, but the more interesting experiment will be a 25-ft. extension of the bow and installation of a gas turbine in the other.

Contract for the gas turbine already has been awarded to the General Electric Co., and bids have been invited for the steam turbine. Both installations are designed to give an increase from the original 2,500 to 6,000 shaft horsepower.

The gas turbine to be tried out is a modified version of a type now in industrial usage and will be the largest such unit operating in a ship of any merchant marine. It is designed to operate on low-grade fuel oil, which should reduce operating and maintenance costs considerably. It will have the largest controllable-pitch propeller ever used in this country.

The work is part of an $11,100,000 experimental program recently approved by Congress. The program will include experiments in special applications of diesel and other types of propulsion power, all aimed at establishing new trends in merchant ship design to strengthen the postiion of the American merchant marine in world trade.

FPC Speeds Things Up

The Federal Power Commission has adopted a speed-up procedure for dealing with producers' applications for certificates to sell natural gas to pipeline companies.

As applications are received, temporary certificates are issued which permit the producers to go ahead with their plans pending final disposition of the case by the commission.

The applications are then scheduled for hearings before an examiner who recommends that a permanent certificate be granted. There is little prospect that any applications will be rejected since there is no reason to believe that any party will oppose a producers' sales.

The hearings, accordingly, are largely a formality designed to get the detailed data regarding producers' sales on the FPC records. They are expected to last only about 5 minutes or so and, for the present at least, will be held by examiners before the regular hearings of the day.

Unless the producers have applications for certificates pending, however, the commission is granting no approvals for new or expanded pipeline facilities requiring new gas supplies. This was first disclosed last month in the suspension of hearings on the proposed American Louisiana pipeline to Michigan to provide time for its producers to come in. *(Oil and Gas Journal, August 9, page 70).* It was emphasized later by the reopening of applications of the Texas Gas Pipe Line Corp. and Transcontinental Gas Pipe Line Corp., on which hearings had been concluded July 20.

Products Line Planned

Standard of Texas taking bids for 248-mile, 6-in. common carrier linking El Paso refinery and Albuquerque terminal

HOUSTON.—Bids are now being received by Standard Oil Co. of Texas for the laying of a 248-mile 6-in. common-carrier products line from El Paso to Albuquerque.

The line's construction will get under way by October 1 and when completed it will be able to move 5,000 bbl. per day of finished products from El Paso refineries to the Albuquerque metropolitan area, which now is supplied only by tank car.

Cost of the pipeline, which will have one pumping station initially, will be more than $4,000,000.

Route . . . The products carrier will originate at Standard of Texas' El Paso refinery, move north near the Fort Bliss Military Reservation, then angle northwest, passing near Las Cruces, the White Sands Proving Grounds, San Antonio, N. M., Socorro, Blen, and Armijo, terminating southeast of Albuquerque.

Capacity of the line, initially 5,000 bbl. per day while operating at 1,100 psi., can be raised to 11,000 bbl. per day by adding a second pump station.

The line will operate as a common carrier, but Stanotex will be the major user. Its refinery at El Paso has been running 26,000 bbl. of crude daily. Products include aviation gasoline, jet fuel, kerosine, motor-fuel gasoline, and automotive and heavy-duty diesel oils.

New terminal . . . Stanotex not long ago purchased a new $80,000 terminal site in Albuquerque and it is in operation, on a railroad tank-car basis. New storage facilities and a new warehouse and loading platform will be constructed at the terminal site.

The new pipeline should be in operation by March 1, Stanotex said. Right-of-way purchases are practically complete, and M. P. Paret, Jr., vice president, has filed an application for a certificate of accelerated amortization for the project with the Office of Defense Mobilization.

Pump station . . . The line's initial pumping station will have two 235-hp. engines, and two positive displacement pumps. Operating pressure of 1,100 psi. will be sufficient to push the products up to the terminal at Albuquerque, Stanotex said.

There will be "take off" points at San Antonio, N. M., and these facilities will be provided for the various military installations along the route should the Government wish to acquire any of the products.

Stanotex told the ODM the carrier would serve national defense and is an effort of the company to efficiently provide ample product supplies for various military areas of West Texas and New Mexico.

Sunray Buys Pipeline

CORPUS CHRISTI, Tex.—A pipeline purchase and a management agreement arranged by the Sunray Oil Corp., Tulsa, have given Suntide Refining Co. here more flexible control of its crude buying.

Sunray purchased the Ed Scurlock Pipe Line Co. and all its facilities serving the Victoria, Tex., area and then consolidated the 55 miles of line with the existing 100-mile system of Sunray Coastal Pipe Line Co.

Suntide then arranged with Sunray to manage the expanded Sunray Coastal system, which can now carry 20,000 bbl. of crude daily or two-thirds of Suntide's capacity.

F. L. Martin is the president of Suntide refining which is 50 per cent owned by Sunray Oil.

Storage Permit Sought

AUSTIN.—Gulf Oil Corp. has asked the Texas Railroad Commission for permission to create and use a third underground cavity in Fannett field of Jefferson County, Texas, for storage of petroleum products from its Port Arthur refinery.

The cavity, which would be leached out of a salt section underlying at 2,113 ft. Gulf's E. Thomas et al lease, William H. Smith Survey, would be the largest of the three, with capacity of about 250,000 bbl. of products.

Gulf received permission in June *(The Oil and Gas Journal, June 21, page 111)* to leach out a 150,000-bbl. cavity under the same lease.

Van's Birthday Celebrated

VAN, Tex.—Ceremonies observing the twenty-fifth anniversary of the discovery of Van pool in Van Zandt County were held.

The strike was made by Pure Oil Co. on October 14, 1929.

Top officials of Pure present for the occasion were: Robert L. Milligan, president; Raymond B. Kelly, senior vice president for exploration and production; James A. Elkins, board member, and James L. Morris, manager of the Texas producing division at Fort Worth. Kelly was a production engineer at Van when the discovery well was drilled.

Test Near Projected Depth

FORT WORTH. — Texas' deepest well was near its projected total depth of 18,500 ft. last week.

The Gulf Oil Corp. I P. G. Northrup, record-breaking deep test in Reeves County, West Texas, was below 18,420 ft. and drilling continued. Gulf officials have made no announcement that drilling would halt at the projected depth and have not ruled out the possibility that the test may be drilled deeper.

The wildcat in mid-August smashed the previous Texas deep-drilling mark chalked up by Superior Oil Co.'s 1 Minnie W. Welder in San Patricio County near Corpus Christi at 17,966 ft. *(The Oil and Gas Journal, August 23, page 104.)*

Contractor on the Gulf well is Parker Drilling Co. The rig being used is reported capable of drilling below 20,000 ft.

WEST COAST

Tidelands Permit Granted

LOS ANGELES.—The State Lands Commission has granted Richfield Oil Corp. a permit for geophysical exploration off the coast of four southern California counties, but opposition to offshore drilling continues to mount.

The Richfield permit covers state tidelands along Ventura, Los Angeles, Orange, and San Diego counties. The commission also extended a Standard Oil Co. of California permit for exploratory work along Ventura, Los Angeles, Santa Barbara, and San Luis Obispo counties.

Meanwhile, Santa Barbara city and county officials were pressing for stricter controls by the state legislature on tidelands drilling. They have proposed the banning of offshore oil exploration adjacent to highly developed residential and recreational areas. A similar plea has been sounded by the city council of Oxnard, in Ventura County.

"Silent" Drilling Planned

LOS ANGELES. — Merchants Petroleum Co. plans to insulate its rigs to quiet drilling operations—and objections of nearby residents—if the Alhambra city commission approves its proposal to explore for oil within the city limits.

The company announced also that it plans to remove its derricks and landscape well sites to prevent eyesores in event oil is found.

Company officials anticipate two to four drill sites will be sufficient to develop 450 acres of directional drilling.

Merchants is attempting to lease acreage in the southwest part of the city. Leases, providing for payment of one-sixth royalty, would require the company to pay $10 per acre per month lease on the land if drilling has not started within 6 months of the date of the lease. The city commission must approve the proposal before drilling can begin.

Pumps Work Eye to Eye

Like two horses eating out of the same trough, these twin pumping units pump out of the same well. The unusual arrangement is at a Shell Oil Co. well in California's Brea-Olinda field. The well was completed in two zones, and each zone has its individual tubing, permitting individual production tests, pumping rates, and pressure tests. The upper zone is producing from 4,530-4,670 ft. The lower pay zone, at 4,710-5,050 ft., flowed from the time the well was completed in May 1953 until February 1954. When the flow ceased, engineers designed a single-line attachment to the horseheads and polish rods so the two units would not collide. Centers of the two tubes are only 3.81 in. apart.

MID-CONTINENT

Line Nears Finish

Great Lakes system to be finished by mid-September

KANSAS CITY, Mo.—Last segments of Great Lakes Pipe Line Co.'s 714-mile products line extensions are scheduled for completion by mid-September.

Completed last week was a 127-mile, 8-in. line from Iowa City, Iowa, to Middlebury, Ill., where it ties in with the Badger Pipeline extending from East Chicago, Ind., to Madison, Wis. Eight-inch lines from Nebraska City to Doniphan, Neb. (132 miles) and from Alexandria, Minn., to Fargo, N. D. (105 miles) were put in operation several weeks ago.

Segments nearing completion are a 161-mile, 12-in. line from Rosemount, Minn., to Alexandria and a 189-mile, 12-in. line between Kansas City, Kans., and Des Moines, Iowa. Extension of its pipeline network assures the company a greater capacity for movement of heating oils and other products to the upper Middle West before the winter season.

The new carriers parallel old lines except from Nebraska City to Doniphan and from Rosemount to Willmar, Minn., en route to Alexandria.

Other improvements . . . A new terminal at Doniphan began operation in August, loading gasoline into motor transport trucks. Distillate deliveries are to begin there this month, and both gasoline and distillate will be delivered this fall.

Work is continuing on 14 storage tanks of 40,000 bbl. at Doniphan and three tanks of similar size at the Mankato, Minn., terminal. Additional loading facilities and other improvements are being provided at the Iowa City terminal.

New pumping facilities also are being installed at numerous points along the system to increase its capacity.

Marine Oil Co. Sold

EL DORADO, Ark. — Controlling interest in Marine Oil Co., El Dorado, has been purchased by a group headed by William J. Sherry, Tulsa independent oil operator, for an undisclosed sum.

One of the early producers in the South Arkansas field, Marine now produces about 2,000 bbl. of oil daily from fields in Arkansas, East Texas, Louisiana, and Montana.

Which Pipe Advantage Saves You The Most?

It all depends on the problem. But the point is, all four of these Armco Welded Pipe advantages help you cut costs or save time.

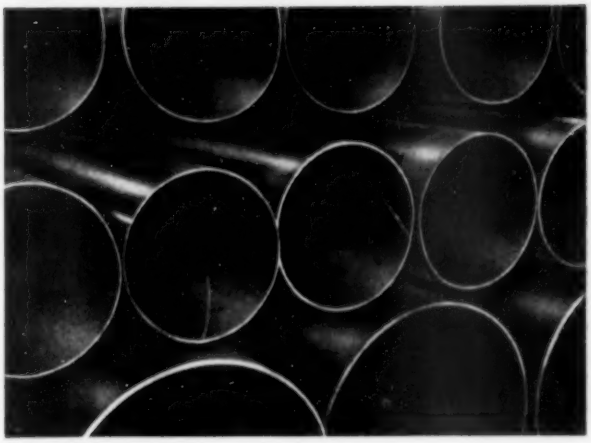
LONG LENGTHS mean you can get Armco Pipe up to 50 feet, or 25% longer than the usual 40-foot lengths. Fewer joints are required. Thus you cut labor costs and speed the job.

UNIFORM LENGTHS mean that Armco Welded Pipe is supplied in exact lengths instead of the usual double-random lengths. You know in advance how many lengths and joints will be required. You save valuable time.

WIDE DIAMETER RANGE—a choice of 20—makes it easy to select the right diameter for your needs. It is unnecessary to compromise your requirements and buy more capacity than warranted. Costs are held down.

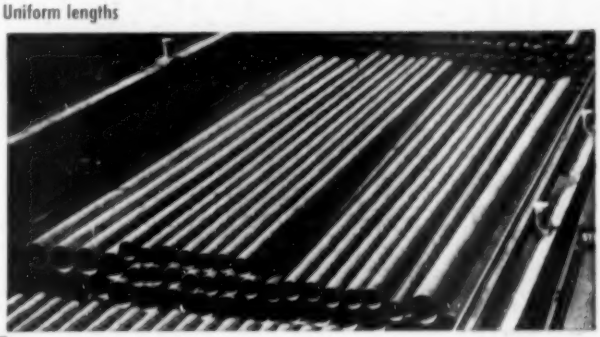
WIDE WALL THICKNESS RANGE—a selection of 10—lets you pick the right strength for your pipe. This eliminates the need to purchase costly and useless extra metal. You save money.

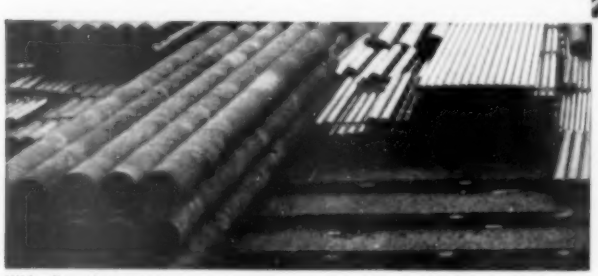
Use Armco Welded Steel Pipe for requirements in the Natural Gasoline and Natural Gas Divisions and wherever else you need dependable line pipe. Write us and ask for more data. Armco Drainage & Metal Products, Inc., Welded Pipe Sales Division, 2604 Curtis Street, Middletown, Ohio. 201 KOME Building, Tulsa, Oklahoma. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.



Wide wall thickness range

Uniform lengths





Wide diameter range

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WELDED STEEL PIPE

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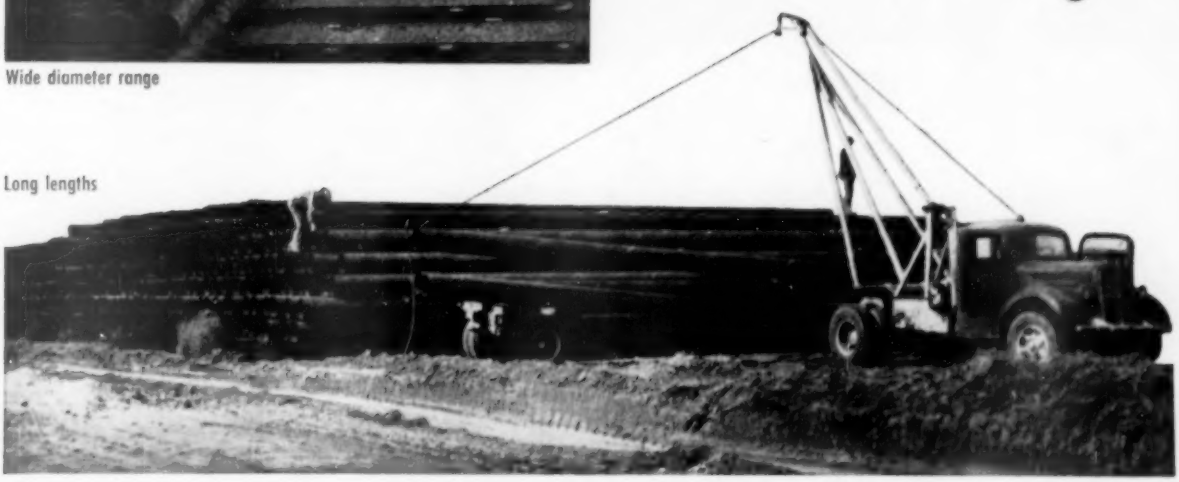
Long lengths



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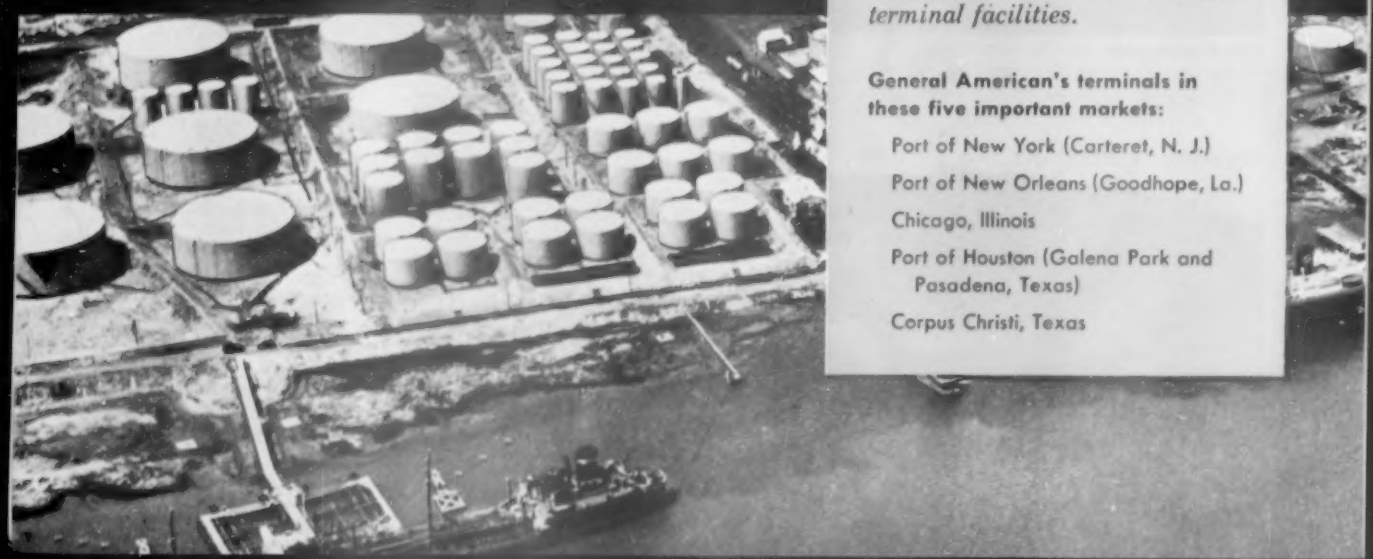
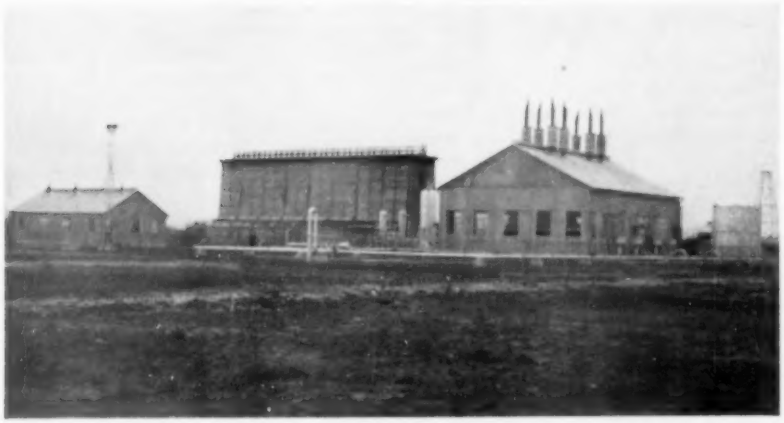
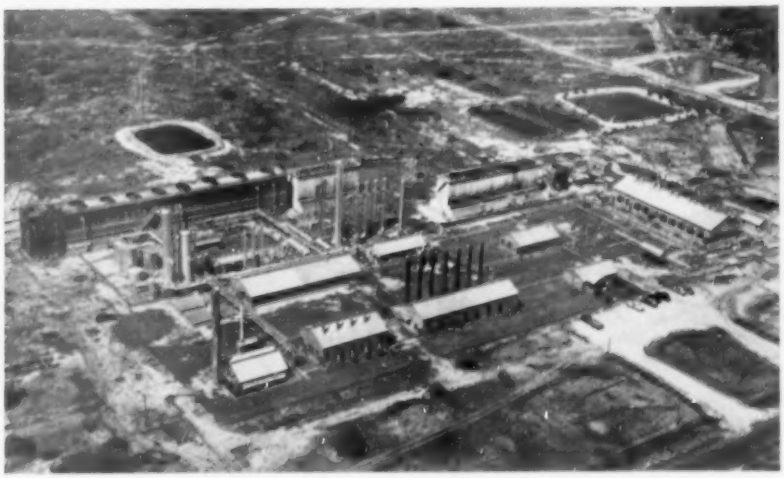




Then **the Wardner plant was designed to handle 50,000,000 cu. ft. of gas daily and produced 800 bbl. of liquids in 1938.**



And Now **the modern plant has a processing capacity of 165,000,000 cu. ft. and produces about 3,000 bbl. of liquids daily.**

World's first cycling plant . . .

. . . Still Going Strong

Robert J. Enright

DALLAS.—The world's first cycling plant, Chicago Corp.'s Wardner installation in Stratton-Agua Dulce field in southwestern Nueces County is still going strong.

The plant was built in 1938. Its successful operation provided the Texas Railroad Commission with its first and most effective tool in combating the flaring of natural gas. Gas wells in those days were regarded by some as worse than dry holes. There was no market for the gas and no way to dispose of it other than flaring or venting.

The original Wardner plant was placed on stream late in December of 1938 with a gas-processing capacity of 50,000,000 cu. ft. a day. It bears little resemblance to the modern installation which occupies the old plant site today.

In its 16 years of existence, Wardner has been revamped and expanded almost continuously. Its present processing capacity is 165,000,000 cu. ft. of gas daily. Production has been boosted from 800 to about 3,000 bbl. of natural-gas liquids daily. The plant is now connected to about 50 wells, compared to the initial 8.

Wardner was set up to handle gas at an intake pressure of 1,100 psi. If well-head pressure exceeds this figure, it is choked back at the well. For lower-pressure gas, the company either installs a compressor in the field where there are only a few low-pressure wells, or boosts compression facilities at the plant when confronted with handling low-pressure gas from a large area.

Chicago's plants manager Roy Schuster says this method of depleting the field will cost considerably less over the long run than producing all wells down to less than 1,100 psi. and installing compression facilities for all wells at the same time (Stratton-Agua Dulce has more than 40 different producing formations).

How it happened . . . Construction of Wardner was due to the conviction and perseverance of two men who doggedly maintained that gas cycling was not only possible but highly practical—against the opinions of many engineering experts.

They were Clyde Alexander, Dallas, who resigned a position as general manager of Phillips Petroleum Co. to prove his idea workable, and John Sheerin, San Antonio.

In addition to its value for liquids produced and as a cure for the gas-flaring evil, they reasoned, residue gas from such a plant in a large reservoir and under one management would be sufficient to supply a pipeline to the East.

Alexander and Sheerin were further sold on the idea as a result of tests conducted by Stearns-Roger Manufacturing Co., Denver. The hard part of the venture was selling the idea to interests which could finance it. Company after company refused to back such a scheme. Most had consulted engineers who said it wouldn't work.

Alexander finally prevailed on a friend, Charlie Glore, who was chairman of Chicago Corp., then strictly a capital investment company, to put up some money. Later, a new company, the Corpus Christi Corp., was formed by Chicago Corp., Alexander, Sheerin, and others including W. K. Warren, Howart Felt, and S. N. Van Wert.

This firm paid $1,000,000 to a wildcatter, John F. Camp, for his lease on the 8,800-acre Stratton Ranch lease. Camp, looking for oil, had brought in five consecutive gas wells on the property.

The new company went in hock for another million dollars for equipment, engineering, and labor. Contract for construction was placed with Stearns-Roger.

The plant was completed 3 days

before Christmas in 1938. By the time it was ready for operation, three more wells had been drilled and one of them was used for injection.

There was only one major mistake in construction. No allowance was made for expansion of the 1½-mile, 8-in. injection line from the plant to the input well. The morning after the plant was placed on stream, the line was discovered arched high off the ground. It was quickly relaid with expansion loops.

The operation was successful from the start. First authentic 24-hour gage was taken January 3, 1939. The plant processed 40,000,000 cu. ft. of gas and produced 800 bbl. of liquids. Separator pressure was 1,200 psi., and injection pressure was 2,765 psi.

Pipeline becomes reality . . . In the next few years, Chicago built two more cycling plants in the Stratton - Agua Dulce area of Nueces County—the Gulf Plains plant 4 miles north of Wardner and the Coastal plant about 4 miles north of the Gulf Plains installation.

By the first of November 1944, with Alexander and Richard Wagner, president of The Chicago Corp., as prime movers, Alexander's vision of a natural-gas pipeline to the East became a reality. A big-inch line was completed by Chicago from Wardner to West Virginia, where the gas was delivered to Hope Natural Gas Co. The line had a capacity of 290,000,000 cu. ft. daily, and 90 per cent of the gas which was piped through it initially was supplied by the Stratton-Agua Dulce plants.

The pipeline was sold by Chicago about the first of 1945 to the newly formed Tennessee Gas Transmission Co. in order that the former, ironically might avoid coming under the jurisdiction of the federal power act.

To date, Wardner and its sister plants, Gulf Plains and Coastal, still turn over about 155,000,000 cu. ft. daily of residue gas to Tennessee Gas Transmission for transmission east for the account of Manufacturers Light & Heat Co., Pittsburgh. Roughly 130,000,000 cu. ft. daily is being cycled—about 40,000,000 of it at both Wardner and Coastal and 50,000,000 at Gulf Plains. Stratton-Agua Dulce gas production is considered sufficient to support full-scale operation of these plants for at least another 20 years.

Eloquent testimony to the success of the plunge at Wardner in 1938 lies in the figures. Since that date, gas-processing capacity of 40,000,000 cu. ft. has swelled to a total cycling capacity over the nation today of nearly 4 billion cubic feet daily.

Shell Stakes Test

Wildcat off Texas coast will drill from platform

HOUSTON.—Shell Oil Co. will try its luck in the Texas tidelands this fall.

The company has announced location for one wildcat on state-owned lands off Brazoria County, and says others will be drilled off the Texas coast later in the autumn.

The first venture will be 17 miles northeast of Freeport on Tract S-249, a few miles off San Luis Pass. The well will probably be drilled from a permanent-type platform.

However, Shell has under contract a new - type submersible "portable platform," owned by Glasscock Drilling Co. of Corpus Christi, which will be ready for service around November 1. It is now being built at the Bethlehem Shipyards in Beaumont.

Shell holds considerable acreage off the Texas coast, where water is deep and where prevailing winds make offshore work difficult. It is in this region, probably in Block L-773, immediately west of Gulf Oil Corp.'s Block L-774, that the new-type portable platform will get its initial "shakedown" test.

Glasscock Drilling Co. believes the portable platform, featuring big caissons which sink a lower jacket assembly to the ocean floor for support, may be the answer to the problems of high winds, heavy seas, and strong currents.

Pollution Halt Ordered

HOUSTON.—A Houston chemical-manufacturing firm has been warned by Harris County Attorney Burke Holman to stop alleged pollution of the air at its Manchester plant within 10 days.

Consolidated Chemical Industries, Inc., which operates a regenerating plant to turn waste material from refineries into sulfuric acid, was told the county would take any necessary step to correct the situation unless the company furnished proof within 10 days that pollution has been halted.

Gulf Pipeline Planned

HOUSTON.—A pipeline to move crude from its offshore platform in the Gulf of Mexico will probably be laid by Standard Oil Co. of Texas within the next few months.

The line would run from the shore of Nueces County, cross under the shallow inlet of Laguna Madre, cross Padre Island, and extend 1½ miles into the Gulf to the platform site.

Stanotex brought in the first offshore oil discovery in the Texas tidelands several months ago, and has just completed the drilling of a directional offset. Three more wells will be drilled from the platform.

Barge operations in the South Texas tidelands area are considered too risky because the prevailing winds and deep water make transfer of crude by this method impractical much of the time. However, barge transportation is the only alternative until pipeline facilities are installed.

There has been some talk of dredging a channel through the Padre Island-Mustang Island point of connection to cut the barge run to Corpus Christi's refining area, but no concrete plans have come forth to date. The barge run from Stanotex' location around Mustang Island to Corpus Christi is about 40 miles.

Offshore Line Planned

HOUSTON.—Plans for a 46-mile, 12¾-in. crude line from Atchafalaya Bay to production platforms off the Louisiana coast are under consideration by Magnolia Petroleum Co. and others.

Magnolia filed application with the Army Engineers at New Orleans for a permit to build the line, which would be the longest and largest - diameter crude carrier ever laid on the bottom of the gulf.

The line would extend to platforms in the Ship Shoal area of Eugene Island, off St. Mary Parish, where Magnolia is currently producing about 5,000 bbl. of crude daily. Eventual capacity of the line would be about 30,000 bbl. daily.

Pure Prepares for Test

HOUSTON. — An offshore drilling platform being installed by J. Ray McDermott & Co., Inc., for Pure Oil Co., 12 miles southeast of Galveston Island, is nearing completion and a wildcat test will be spudded from it in about 2 weeks.

Pure is associated with Ohio Oil Co. and Melben Oil Co. in the venture, which is on OCS-0109. The group has a 1,440-acre lease which was acquired several years ago by Ohio and Melben. Pure entered into a participation agreement by which it will be the operator.

Water over the drilling site is 60 ft. deep. The 70 by 106-ft. template-type platform will be served by a drilling tender.

Location of this wildcat is just outside the 10.35-mile boundary between state owned and federally owned lands, and is in the same general area in which Stanolind Oil & Gas Co. drilled a dry hole, which was abandoned at 14,000 ft.

Royalite Buys Hi-Way

Saskatoon refinery and pipeline facilities included in purchase of big independent Canadian oil producer

CALGARY.—Royalite Oil Co., Ltd., of Calgary, one of Canada's leading independent oil-producing and exploration companies, has purchased Hi-Way Refineries, Ltd., largest independent oil company in Saskatchewan and a pioneer in the Canadian refining industry.

Through the purchase, Royalite acquired all the stock of Hi-Way Refineries, Ltd., and its subsidiary, Alberta Hi-Way Refineries, Ltd., together with its 80 per cent interest in the Saskatoon Pipe Line Co.

Acquisition of Hi-Way's 6,500-bbl. refinery at Saskatoon brings Royalite's refining capacity in western Canada to 17,500 bbl. per day. In addition to the Saskatoon refinery, Royalite operates 5,000-bbl. refineries at Coleville, Sask., and Kamloops, B. C., and a 1,000-bbl. unit at Prince Albert, Sask. Royalite also owns gasoline-absorption, propane, and sulfur plants at Turner Valley, Alta.

Exploration planned . . . As a wholly owned subsidiary of Royalite, the new firm will operate under the name of Royalite-Hi-Way, Ltd. Under a 5-year expansion program, the firm plans not only to enlarge its marketing facilities in Saskatchewan and Manitoba, but also to branch out into the exploration and development phases of the oil industry in Saskatchewan.

Head office of the new company will remain in Regina, according to a joint announcement by C. U. Daniels, president and managing director of Royalite, and Charles C. Hay, president and general manager of Hi-Way.

Hay succeeds S. J. Sackett, who resigned as president of Saskatoon Pipe Line Co.

Price paid for the Hi-Way interests was not disclosed.

Pioneer refiner . . . Hi-Way Refineries, Ltd., was incorporated in Saskatchewan in 1931. It started its operations with a small skimming plant at Regina which had a capacity of about 200 bbl. per day and processed imported crude. During the next 2 years the company built 300-bbl.-per-day plants at Rosetown and Saskatoon.

This era marked the birth of independent refining operations in Saskatchewan and by the end of 1933 there were eight independents operating in the area. All were reportedly near financial collapse in February 1934, when Sackett came into the province from Chicago and bought the eight struggling refineries.

Sackett also acquired several bulk stations scattered through Saskatchewan and consolidated their operations under the Hi-Way banner. During the intervening years all but the Saskatoon plant have been dismantled and converted into bulk stations.

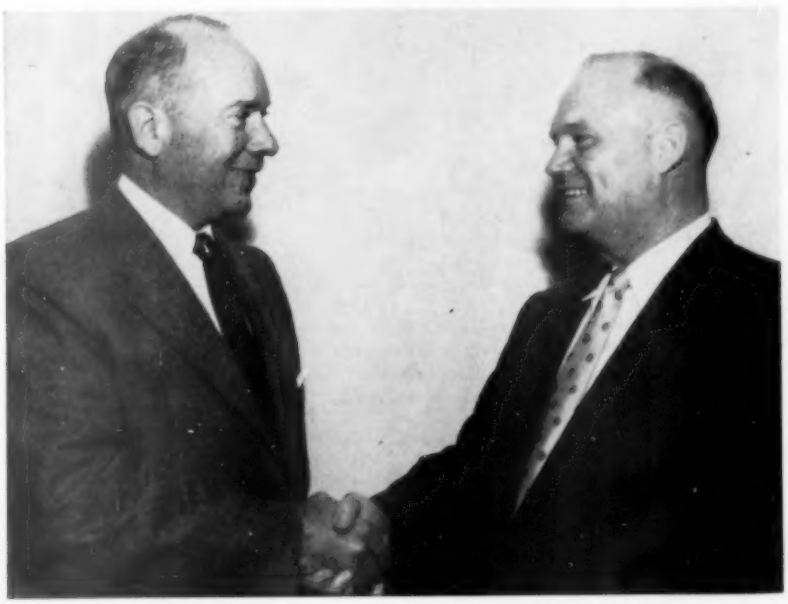
Plant enlarged . . . At Saskatoon an expansion and modernization program was started in 1949 and during the past 4 years the company has spent approximately $6,250,000 increasing the refinery's capacity from 300 bbl. a day to its present capacity of 6,500 bbl. The program included installation of a modern Universal Oil Products catalytic cracking unit and a polymerization unit.

Saskatoon Pipe Line was founded in 1952 and it constructed a 56-mile, 6-in. crude pipeline from a takeoff point on the Interprovincial line at Milden, Sask., to Saskatoon to serve the enlarged refinery.

Officers of Hi-Way Refineries, in addition to Hay, include H. E. McDonald, vice president and general sales manager, and L. C. Slater, secretary and treasurer.

Royalite holdings . . . At present, Royalite is operator of 250 oil wells and 70 gas wells and has interest in 5 oil wells and 22 gas wells operated by others. Its main interests are in Turner Valley, Redwater, and Stony Plain fields of Alberta and in the Coleville field in Saskatchewan.

In 1953 the company acquired a one-third interest in approximately 14,000 acres of prospective oil and gas lands in Louisiana, near the Gulf. One well has been completed as a wet-gas producer in that area and exploration is continuing.



HANDSHAKE to seal the deal follows the sale of Hi-Way Refineries to Royalite. Ray Althouse, Calgary, left, Royalite executive vice president, and Charles C. Hay, Regina, Hi-Way president, exchange congratulations.

Spacing Conference Called

REGINA, Sask.—Spurred by a Canadian Gulf Oil Co. application for 80-acre spacing in the Frobisher area of southeastern Saskatchewan, the Department of Mineral Resources will hold a meeting here October 1 to discuss an interim spacing pattern and field boundaries.

The meeting will be attended by oil companies operating in the Frobisher area and members of the petroleum branch of the department.

Canadian Gulf holds varying interests

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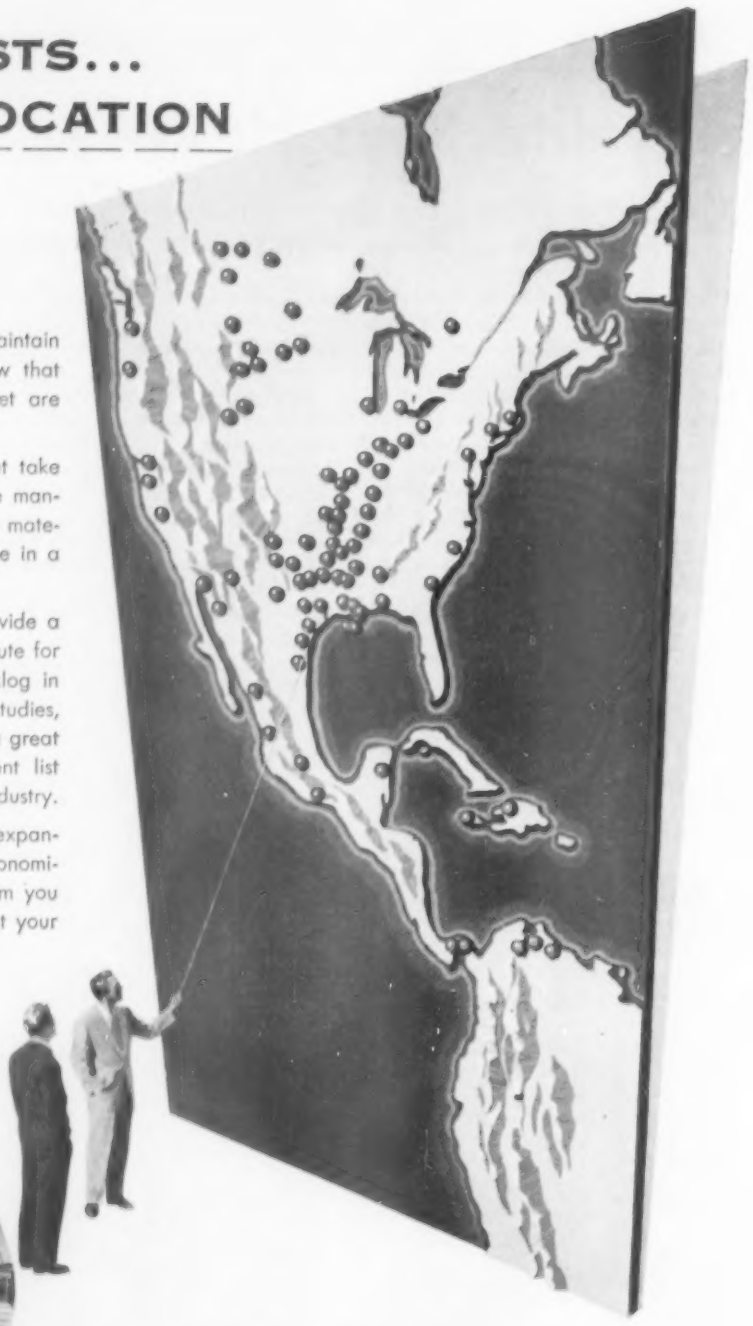

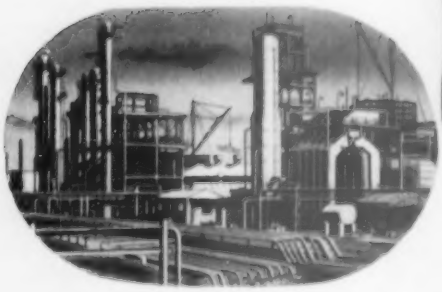

A large part of Brown & Root's activity has centered around the process industries in the design and construction of plants for heavy chemical, petroleum, petro-chemical and organic chemical fields.

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in four wells capable of Mississippian production near Frobisher and is drilling ahead on a fifth. Other companies drilling in the immediate area are British American Oil Co., Ltd., and Royalite Oil Co., Ltd. Other companies participating in the development include Canadian Devonian Petroleums, Ltd., Triad Oil Co., Ltd., and Union Oil Co. of California. Sun Oil Co. and Imperial Oil, Ltd., hold acreage in the area but are not drilling at the present time.

Gull Lake Land at Premium

EDMONTON, Alta.—California Provincial Co. paid top price of $3,126,667 for drilling reservations on 7,362 acres west of Gull Lake in the Alberta government's most recent sale of petroleum and natural-gas rights.

The province netted $3,850,133 for 57,747 acres in 10 parcels of land.

Two parcels immediately south of the California Provincial purchase brought $393,200 and take in the land from Gull Lake to Sylvan Lake in Central Alberta. The first, 7,065 acres, went to Seaboard Oil Co. for $235,200. Western Leaseholds, Ltd., and Oil Operators, Ltd., bought the second parcel of 7,250 acres for $158,000.

The remaining seven tracts in the sale brought varying small amounts. They were scattered in other parts of the province.

Heavy revenue from oil and gas established a new record income for the provincial government during the first fiscal quarter, Provincial Auditor C. K. Huckvale disclosed recently. In the 3-month period, oil and gas lease sales provided the government with about $15 million, oil and gas fees and rentals another $5,040,255, and oil and gas royalties with $3,226,704.

Pembina Pipeline Started

EDMONTON, Alta. — Construction has started on a $15 million crude pipeline from Buck Creek, in the Pembina field, to Edmonton.

The initial 72-mile main transmission line will terminate near the Interprovincial and Trans Mountain pipeline stations east of Edmonton. When completed, the project will cover about 400 miles, including feeder lines from producers.

The initial phase of the project is scheduled for completion on November 15, James Scott, president of Pembina Pipe Line Co., said.

Approximately 100 wells are expected to be tied in to the pipeline by November 15. Others will be tied is as gathering systems are completed. Construction on the right-of-way from the Buck Creek station was started July 15 by Mannix, Ltd., of Edmonton.

When the entire system of feeder lines is completed, the main line will carry about 150,000 bbl. of oil daily. Most of the oil will be shipped through either the Interprovincial or the Trans Mountain lines, or both.

ROCKY MOUNTAIN

Lease Terms Defended

Five associations join in challenging federal judge's ruling threatening validity of unit clause in contracts

DENVER.—Five oil and gas associations last week entered a hotly contested lawsuit here in the role of "friends of the court" in an effort to reverse a Utah federal judge's ruling which is regarded as a threat to all long-term oil and gas leases.

The five associations joined Phillips Petroleum Co. before the U. S. Tenth Circuit Court of Appeals in attacking the decision of U. S. District Judge Willis Ritter that the unit or pooling clause in standard lease forms used in the Rocky Mountains and Mid-Continent is invalid. The appeals court is expected to hear the case within the next few weeks.

Attorneys representing the Mid-Continent Oil and Gas Association, the Rocky Mountain Oil and Gas Association, the Western Oil and Gas Association, the North Dakota Oil and Gas Association, and the New Mexico Oil and Gas Association filed a joint brief before the court here.

The associations seek to overthrow the lower court decision that the unit or pooling clause violates the common-law rule against perpetuities—one of two central questions involved. Judge Ritter's ruling that the clause in the lease is "too indefinite" is being fought by Phillips alone.

What's involved . . . The case first went to court in Utah when several companies attempted to set up a field-wide unitization program for Roosevelt pool in Uintah County, Utah, with Carter Oil Co. as the operator. Thirty-one owners of land on which Phillips holds leases in the proposed 34,000-acre exploratory unit objected.

The leases contained the standard pooling clause found in many oil and gas leases which allows the operator to pool or unitize. The Utah judge said this clause violated the ancient common-law principle which prohibits transfer of land to heirs or assigns with restrictions which run for a period longer than the life of any such person plus 21 years. The "rule" is usually invoked against wills and bequests which attempt to govern the actions of people or the disposition of estates in future generations.

Since the material facts involved in all 31 leases involved are identical, the question was appealed to the Circuit Court in only two cases involving the leases Phillips holds on the land of Heber P. Peterson and John H. Haslem.

Attorneys for Phillips and the five oil and gas associations contend that no transfer or property interests "pursuant to a power of appointment" are involved and therefore no perpetuity question is involved.

They told the appeals court last week that if the Utah court is upheld "a precedent will be set which will seriously affect the property rights of owners of mineral interests who have relied upon the validity of provisions identical or similar."

Sapphire Invades Wyoming

TORONTO. — Sapphire Petroleums, Ltd., recently acquired more than 14,000 net acres of oil leases in the Clareton trend area of Powder River basin, Wyoming.

Maxwell Goldhar, president, said the transactions increased the company's crude-oil reserves from approximately 8,000,000 bbl. to approximately 58,000,000 bbl.

Goldhar said Sapphire purchased the interests of Garnak Drilling Co., Denver, in oil and gas leases covering 20,776 acres near Newcastle, in Weston County. The company's net working interest in the tract totals 13,109 acres, he said.

Sapphire also recently entered into a farmout arrangement giving it a 50 per cent working interest in an aditional 3,880-acre tract in this area.

The Clareton properties included 61 producing oil wells when the transaction was completed several weeks ago. Since then, Sapphire has opened a field office at Newcastle and has begun drilling of seven additional wells.

Companies Consider Merger

DENVER.—A proposal to merge Derby Oil Co., Wichita, into Colorado Oil & Gas Corp., Denver, is expected to be presented to stockholders of the two companies for their approval within 30 to 45 days.

W. C. Norman, president of Colorado Oil & Gas Corp., and W. G. Tierney, president of Derby, said plans for the merger have been agreed upon "substantially."

Under merger plans announced last week, persons holding Derby common stock would receive an equal number of shares of a new preferred stock of Colorado Oil & Gas which would be convertible into Colorado Oil & Gas common stock.

Derby's principal oil-producing properties are in Kansas, Oklahoma, Texas, and Nebraska. The company has a net crude-oil production of approximately 3,400 bbl. per day. It recently modernized its 15,000-bbl. refinery at Wichita.

Colorado Oil & Gas, 64 per cent owned by Colorado Interstate Gas Co., Colorado Springs, has gas reserves in Kansas, Oklahoma, and New Mexico. It also has more than 500,000 net acres of leases in the Rocky Mountain region, Nebraska, Kansas, and Oklahoma, in addition to oil and gas production on the Texas Gulf Coast.

MEETINGS

IOCC Speakers Picked

OMAHA, Neb.—J. C. Donnell, II, president of Ohio Oil Co., will be the featured speaker here September 10 during the second day of the three-day summer meeting of the Interstate Oil Compact Commission.

Donnell will discuss "The Will to Conserve."

The opening day of the meeting will include meetings of the engineering, legal, and research and coordinating committees.

In the afternoon following Donnell's address, I. N. McKinnon, chairman of the Alberta Petroleum and Natural-Gas Conservation Board, and William J. Murray, Jr., member of the Texas Railroad Commission, will speak on "Conservation."

Gov. Johnston Murray of Oklahoma, commission chairman, Gov. Robert B. Crosby of Nebraska, and Gov. Edward F. Arn of Kansas will speak.

Paul Kayser, president of El Paso Natural Gas Co., Houston, will be featured speaker during the morning session of the final day. Kayser will speak on "Problems of Marketing Residue Gas As Complicated by the Phillips Decision."

Model Shows How Loudon Water Flood Works

Carter Oil Co. used this model to explain to visitors how water is used to increase recovery and prolong life from a declining oil field. The model uses liquids of different color to distinguish between injection water and produced oil. The demonstration was a part of Carter's recent "open house" at Loudon field for members of the press (The Oil and Gas Journal, August 30, page 50).

Gas Order To Be Discussed

BATON ROUGE. — Effect of the controversial Supreme Court ruling placing vast segments of the natural-gas industry under federal control will be discussed at the annual meeting of the Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association, in New Orleans September 16-17.

Rex Baker, vice president and general counsel of Humble Oil & Refining Co., Houston, will discuss the problem of producing gas under regulation of the Federal Power Commission. Baker is one of three attorneys representing the Mid-Continent Oil and Gas Association in a petition for rehearing of the case.

Names and topics of other speakers participating in the 2-day program include E. P. Hubbard, Gulf Oil Corp., Houston, developing managerial personnel; James V. Brown, National Petroleum Council, Washington, D. C., industry costs; Edwin A. Wiggin, Atomic Industrial Forum, New York, impact of atomic power on the oil and gas industry; Ralph Davis, Houston, oil and gas reserves; and H. B. Miller, Oil Industry Information Committee, industry public-relations problems.

Production Papers Set

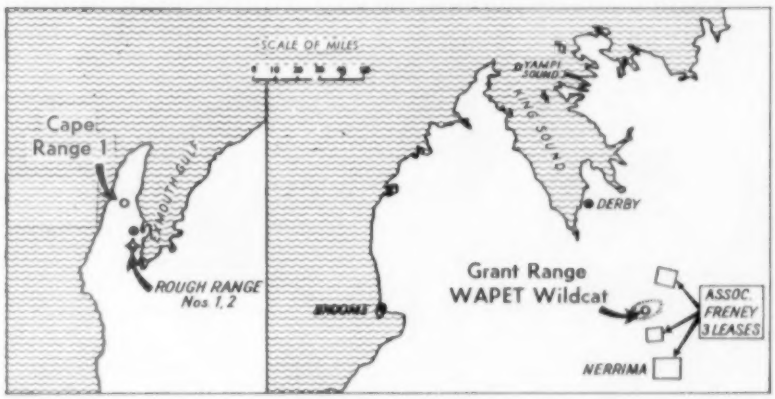
STATE COLLEGE, Pa. — Eleven papers on technical aspects of petroleum production by secondary recovery will be presented at the eighteenth annual conference on petroleum production at Pennsylvania State University October 6-8.

Authors of papers already scheduled for presentation include C. R. Holmes, E. James Moore, J. R. Emery, J. C. Griffiths, J. Hutta, T. M. Doscher, R. N. Tuttle, J. G. Paez, J. C. Calhoun, Jr., C. Stockwell, J. Warren, A. T. Corey, R. E. Wainerdi, R. F. Nielsen, R. M. McFarlane, R. B. Bossler, and A. H. Meldrun.

Water-Treating Panel Set

TULSA. — A panel discussion of water treating will be a main feature of the Oklahoma regional meeting of the Natural Gasoline Association of America, September 17 at Oklahoma City.

Panelists will include J. S. Conners, Phillips Petroleum Co., Bartlesville; J. W. Kilmer, Stanolind Oil & Gas Co., Tulsa; and L. M. Mauney, Warren Petroleum Corp., Tulsa. Moderator will be R. G. Boatright, also of Phillips Petroleum.



Australian oil fever high as . . .

. . . Exploration Continues

THE worst fire in the history of Derby, tiny township on Australia's northwest coast, destroyed the hotel and general store last month, but the 400 residents of the town are so oil-struck they're taking it in their stride.

Derby is being invaded by oil men and is secure in the knowledge that West Australian Petroleum Pty., Ltd., has already spent $8 million in its efforts to find oil. Derby has its eye on what will be spent in the future.

West Australian is erecting a base camp and stores area at Derby to serve a 60-man mobile drilling camp for its first wildcat in the Fitzroy basin at Grant Range about 75 miles south of Derby.

The wharf at Derby, which seldom sees a vessel bigger than a fishing boat, has been strengthened to receive the heavy sections of the National 100 rig purchased from the government and due to arrive any day. The rig is being shipped 1,300 miles from Perta in a chartered vessel. Roads are being built through wild and almost uninhabited semidesert country to provide access to the well site.

The Grant Range test is only one phase of an important new stage of exploration for West Australian. The program involves an extension of the Rough Range drilling to the huge Cape Range and further drilling at Rough Range.

Cape Range . . . The company's plans to drill its first test at Shothole Canyon in the Cape Range have aroused keen interest in Australia. The Cape Range structure is estimated to be 50 times the size of Rough Range and as a result of geological and seismic investigation is thought to be the most attractive prospect on the Australian mainland.

To speed up the spudding of Cape Range 1, the rig which drilled a dry hole at Rough Range 2 has been moved to Shothole Canyon.

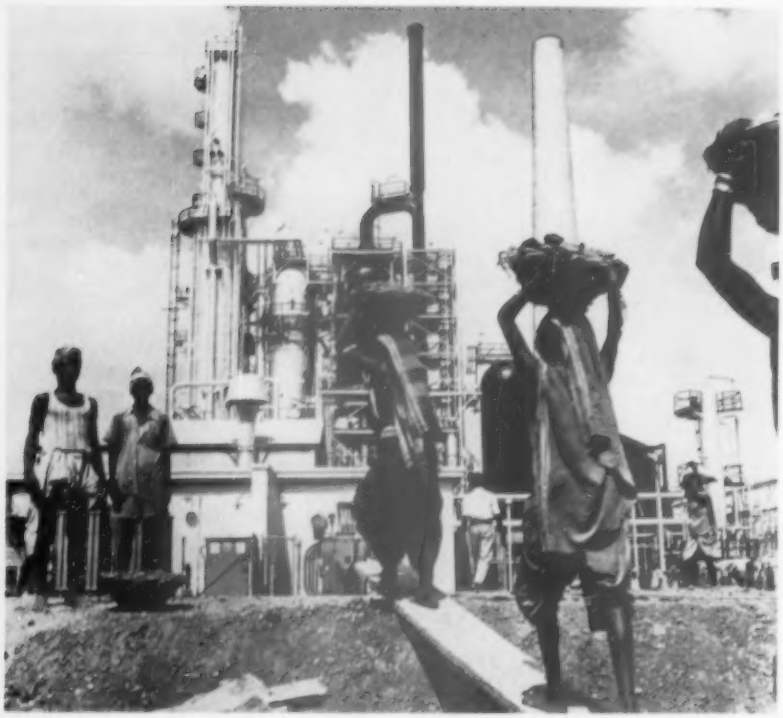
Rough Range . . . Operations at Rough Range are at a virtual standstill. Rough Range 1, which struck Australia's first flow of oil last December, has made no progress since early last month when a 10-ft. section of tailpipe stuck in the hole during the eighth attempt to make a formation test at the 9,898-9,913-ft. interval.

Since that time a milling shoe, a blasting tool and cable have been added to the junk in the well and so far have defied removal.

Rough Range 2, some 3,000 ft. west of the discovery well, was abandoned as a dry hole. The production sand found at 3,605 ft. in the discovery well was encountered lower in the second test but an open-hole test recovered only salt water.

SHOTHOLE CANYON where West Australian Petroleum plans to begin a new wildcat.

ROUGH RANGE 1 is troubled with a fishing job at about 9,900 ft. Drilling is at a standstill and has been since early last month when a 10-ft. section of tailpipe became lodged during an attempted formation test.



Stanvac on stream with India's . . .

. . . First Major Refinery

FURTHER evidence that Abadan's former markets have been forfeited to new refineries constructed during the last 3 years has been given by the completion of Standard - Vacuum's new Bombay, India, plant.

This 25,000-bbl. per day refinery has been brought on stream 6 months ahead of schedule. It cost approximately $32,000,000 and is the first large refinery in India.

Prior to the nationalization of Anglo-Iranian's properties in Iran in 1951, India provided a sizable market for products manufactured at the Abadan refinery. Standard-Vacum bought products f.o.b. the Persian Gulf under contract with Anglo-Iranian and moved them into its markets in India, South Africa, and other areas.

The impetus for construction of Stanvac's new Bombay refinery—as well as the two others currently under construction in India—came when the Iranian shutdown halted Stanvac's contracted supplies from Anglo-Iranian. In the dislocation of the oil trade that followed, India experienced a shortage of aviation gasoline and other products.

Abadan threatened . . . After the nationalization in Iran, six separate refinery projects were started in the East-of-Suez, Indian Ocean area. These in all provide about 220,000 bbl. daily in additional refining capacity or nearly half of what Abadan once had.

The Bombay refinery of Stanvac is the third of these plants to come into operation. A few months ago Anglo-Iranian commissioned its 120,000-bbl.-daily Aden refinery, and early this year, Stanvac completed a new 15,600-bbl. refinery at Durban in South Africa. Still to be finished are Burmah-Shell's 40,000-bbl. refinery at Bombay, Caltex's 10,000-bbl. plant on India's East Coast, and Anglo-Iranian's 70,000-bbl. refinery in western Australia.

Buildup in refinery capacity in Europe and the Far East as well as Southeast Asia lay behind the refusal of the negotiators for the eight-company international consortium to promise a high operating level for Abadan under the recent settlement with Iran. Whether Abadan will ever be back at its former rate of half a million barrels per day is problematical.

The new Bombay refinery, which is operated by the subsidiary Standard-Vacuum Refining Co. of India, Ltd., was built by the Lummus Co. as principal contractor. Process facilities are centered around an integrated combination unit. The Model IV fluid catalytic cracking unit has a capacity of 5,100 bbl. per stream day in fresh feed. There also is capacity of 4,200 bbl. per stream day in thermal reforming.

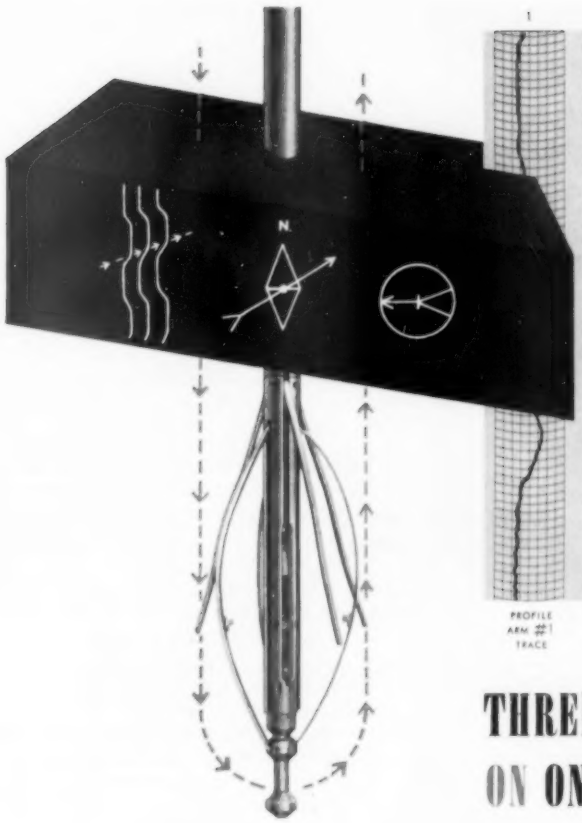
Market growing . . . The new refinery will turn out products for a growing and important petroleum market. This year, India will use an average of about 89,000 bbl. daily, including bunkers, and of this about 22 per cent will be motor fuel and nearly 30 per cent will be kerosine. India's consumption gained 4.5 per cent last year, and the anticipated increase this year is 3.3 per cent.

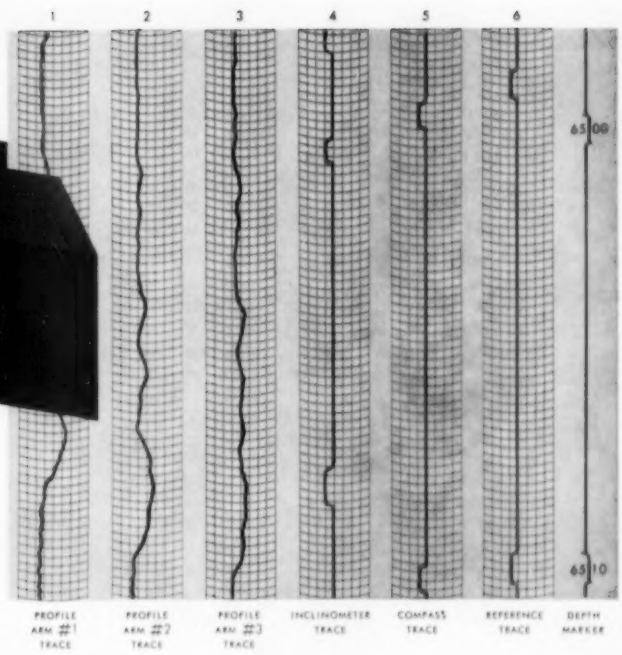
Stanvac's refinery will produce about 7,050 bbl. of gasoline daily in addition to 3,130 bbl. of kerosine, 4,620 bbl. of diesel fuel, 4,550 bbl. of fuel oil, and 3,840 bbl. of bunker fuel oil. Its operation will save India about $2,400,000 a year by substituting crude for the more expensive products provided for in the oil import bill.

The 280-acre site is on Trombay Island which is actually a peninsula in the Bombay harbor area about 13 miles east of the city. Nearby is the Burmah-Shell plant which is due to be finished early next month. Both these refineries will receive crude and move part of their production through a pipeline system which the Bombay Port Trust has built from Trombay to Butcher Island. A 30 to 38-ft. water depth will allow 26,000-ton tankers to reach Butcher Island. The pipelines consist of two 24-in. lines for crude, one 24-in. for black products, two 16-in. and one 12-in. for white products, and one 8-in. water line.

Agreement . . . Stanvac's project, first announced in December 1951, represents the first large-scale private foreign investment in India after the country gained its independence in 1947. Uncertainty and nationalistic sentiment had caused foreign investors to shy away from the country. Stanvac obtained a 25-year guarantee against nationalization of its refinery, assurance of foreign exchange for profits remission, and other concessions. Terms of its agreement were followed by Burmah-Shell and Caltex.

Standard-Vacuum's arrangement with the Indian Government calls for offering interest in the refining company to Indian investors. A 25 per cent preference stock interest is to be placed on the market in India after the refinery has gone into full operation and begins to show a profit. A year ago, Indian investors snapped up an $8,400,000 debenture issue offered by the refining company.





THREE DOWN HOLE SURVEYS ON ONE CONTINUOUS TRIP

DIP LOG DATA IMPORTANT GUIDE TO PAY ZONES

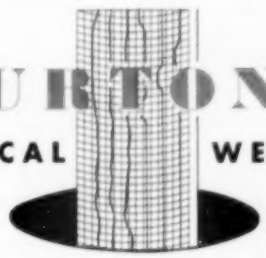
The complete, accurate Dip Log record of every foot of hole gives you a factual basis for locating test wells higher on structure or developing the reservoir of a productive test. With complete records of dip angle and direction, directional survey and a caliper survey, Halliburton's Dip Log sets up a series of electronic guideposts for future operations.

Actually, seven simultaneous curves are recorded to provide an accurate log of dip angle and strike. Three caliper arms of the logging instrument "feel" the irregularities of bore erosion and give independent profiles on three sides of the hole. In addition, traces showing orientation of the tool, inclination and direction of the hole, depth mark and a lubbers line are obtained.

All curves are recorded simultaneously with no stops for stationing from bottom to top. A single conductor cable of Halliburton's FM System carries data to the recorder where it is recorded on a sensitive lateral and depth scale of 1" of record to 1' of hole.

Careful interpretation of the results by Halliburton specialists provides dip angle and direction at any level from total depth to casing where sufficient erosion has occurred. A directional survey is computed by direct calculation of the Dip Log record. And a continuous caliper can be recorded with a standard depth scale for calculating fill up and packer seat data.

Dip Log's rigid standard of accuracy, demonstrated by dips of 5° measured with an accuracy of ±1°, gives you a sound backing for confidently moving "up structure" or locating the most profitable pay zone. For this complete package of formation information, call your local or district Halliburton office. Or contact Halliburton Oil Well Cementing Company, Duncan, Oklahoma.



HALLIBURTON

ELECTRICAL WELL SERVICES

PERPETUAL PROGRESS IN PRODUCTION IMPROVEMENT TECHNIQUES

Foreign Production Up

Crude output in U. S. drops during first half of 1954 while remainder of Free World has substantial increase

FOREIGN crude-oil production showed another substantial gain during the first half of 1954, and again most of the increase was in the prolific fields of the Middle East.

Figures for the first 6 months of the year point up the continued disparity in the domestic and foreign rates of production. In contrast to the increases abroad, cuts in allowables during the first half resulted in a slight decline in United States output.

Daily production in non-Communist countries outside the United States during the first 6 months averaged approximately 5,756,900 bbl. daily, up 9.7 per cent. First-half crude output in the United States dropped about 61,000 bbl. daily from the same period of 1953 to average 6,452,000 bbl. daily.

In the Middle East, first-half production averaged 2,650,000 bbl. daily. This represented an increase of 273,100 bbl. daily, or 11.5 per cent, over the corresponding period of 1953. The increase in Middle East production during the first half of this year comprised 54 per cent of the total gain in non-Communist foreign output.

Nears U. S. output . . . Total Free World production was up 3.8 per cent to an average of 12,208,500 bbl. daily. This first-half increase was due entirely to the higher foreign output. Since shortly after World War II, foreign production has gained almost steadily, and if the present trend continues, non-Communist foreign output will for the first time reach the United States level in another year or year and a half.

Reports for June showed a relatively small decline of 39,700 bbl. daily in Free World crude production as compared to the previous month's average. The June average was 12,298,300 bbl. daily. United States production gained slightly in June to an average of 6,500,000 bbl. daily, while total non-Communist foreign production was off 68,900 bbl. daily to 5,798,300 bbl.

Production in all three of the world's major foreign oil-producing countries dropped back during the month. Venezuela was down 36,200 bbl. daily to 1,828,800 bbl. daily. Other decreases were reported in Kuwait and Saudi Arabia.

Middle East production declined from its near-record level of May. The June average was 2,684,800 bbl. daily, down 81,200 bbl. The highest monthly production to date in the Middle East was the 2,767,600 bbl. daily which was produced last March.

Kuwait declines . . . Saudi Arabia was down 71,600 bbl. daily below the all-time high of 1,026,800 bbl. daily in May. Kuwait showed a small drop of 24,800 bbl. daily. Saudi Arabia, which fell behind Kuwait for the first time last year, regained its leading position during the first half of this year. Output in Saudi Arabia for the 6-month period averaged 965,6002 bbl. daily against 897,600 bbl. daily in Kuwait.

Iraq's production rose to a new high in June, gaining 12,200 bbl. daily over the May average. Of this total, Kirkuk field's output contributed 508,100 bbl. daily and Zubair, 90,500 bbl. daily. Another production record was set in the Persian Gulf shaikhdom of Qatar which produced just under 100,000 bbl. daily in June.

Although Venezuelan production

TREND OVER THE LAST YEAR

1953—	Western Hemisphere less U.S.	Middle East	Total non-Communist foreign
July	2,487.7	2,536.0	5,450.1
August	2,443.3	2,489.0	5,387.3
September	2,485.7	2,416.4	5,345.3
October	2,519.5	2,528.1	5,511.5
November	2,651.9	2,341.7	5,461.6
December	2,711.9	2,540.2	5,714.1
1954—			
January	2,682.8	2,491.2	5,636.4
February	2,703.7	2,550.6	5,695.3
March	2,642.9	2,767.6	5,872.7
April	2,565.1	2,642.0	5,653.1
May	2,642.7	2,766.0	5,867.2
June	2,645.9	2,684.8	5,798.3

CRUDE-OIL PRODUCTION

(Daily average in thousands of barrels)

Country—	June 1954	May 1954	June 1953
W. Hemisphere:			
Argentina	80.0	76.8	78.3
Bolivia	3.5	3.2	1.3
Brazil	2.1	2.1	2.5
Canada	260.0	231.0	226.9
Chile	4.5	4.5	3.0
Colombia	113.5	112.2	105.5
Cuba	0.1	0.1	0.1
Ecuador	8.5	8.5	8.0
Mexico	233.0	227.0	181.3
Peru	47.4	47.8	44.5
Trinidad	64.5	64.5	60.8
Venezuela	1,828.8	1,865.0	1,825.6
Total	2,645.9	2,642.7	2,537.8
W. Europe and Africa:			
Algeria	1.7	1.6	1.7
France	8.6	8.3	7.3
Fr. Morocco	2.5	2.5	2.1
W. Germany	51.5	50.4	42.4
Italy	1.6	1.5	1.9
Netherlands	18.2	18.4	15.8
Egypt	38.2	38.6	46.1
United Kingdom	1.2	1.2	1.1
Total	123.5	122.5	118.4
Middle East:			
Bahrain	30.1	30.1	30.1
Iran	34.3	36.7	38.6
Iraq	636.6	624.4	588.7
Kuwait	912.2	937.0	906.5
Neutral Zone	16.0	14.0	
Qatar	99.8	96.4	90.8
Saudi Arabia	955.2	1,026.8	880.9
Turkey	0.6	0.6	0.4
Total	2,684.8	2,766.0	2,536.0
Other Asia:			
British Borneo	100.0	99.0	101.7
Burma	3.5	3.5	2.5
India	7.0	7.0	5.6
Indonesia	210.0	203.0	211.9
Japan	5.6	5.6	5.8
New Guinea	12.8	12.7	4.6
Pakistan	5.2	5.2	3.9
Total	344.1	336.0	336.0
Total, non-Communist foreign	5,798.3	5,867.2	5,528.2
United States	6,500.0	6,470.8	6,594.6
Total Free World	12,298.3	12,338.0	12,122.8
Est. Russia & E. Europe:			
Russian Zone, Austria	62.0	62.0	65.0
Romania	110.0	110.0	95.0
Russia	1,135.0	1,135.0	1,035.0
Other Communist	36.1	36.1	33.8
Total	1,343.1	1,343.1	1,228.8
World total	13,641.4	13,681.1	13,351.6

Figures are from reliable reports in the industry or official government sources. Data for Russia and Eastern Europe are based on competent estimates; no authentic information is available on month-to-month production in these regions. Estimates also have been made for certain other countries, particularly in Southeast Asia, for which completely current reports are lacking. Iranian production shown is net output, the gross less recycled material. Other Communist includes China and Yugoslavia as well as the Soviet satellite countries in Europe.

Compressor cooling fan driven by **DENISON** hydraulic equipment

SOUTHWEST Industries, Inc., Houston, has adapted conventional cooling to its packaged compressor plant—using Denison Pump/Motors to power the cooling unit.

The powerful pump/motors drive a vertically mounted fan which sucks air up through coils and discharges heat above the compressor. The Southwest unit is more efficient than radiators—more than twice as efficient as other vertical-discharge coolers.

Pump/motors take less space than mechanical drives, making room for more coils. Maintenance is easy because of the simple hydraulic connection to the fan.

When ambient temperature varies, the Denison Relief Valve can be adjusted to allow no more torque than is required for cooling. Horsepower saved is applied to compression of more gas.

Why not benefit from Denison's experience in applying pumps, fluid motors and controls to all types of machinery. Write to:

THE
DENISON ENGINEERING COMPANY
1176 Dublin Road, Columbus 16, Ohio

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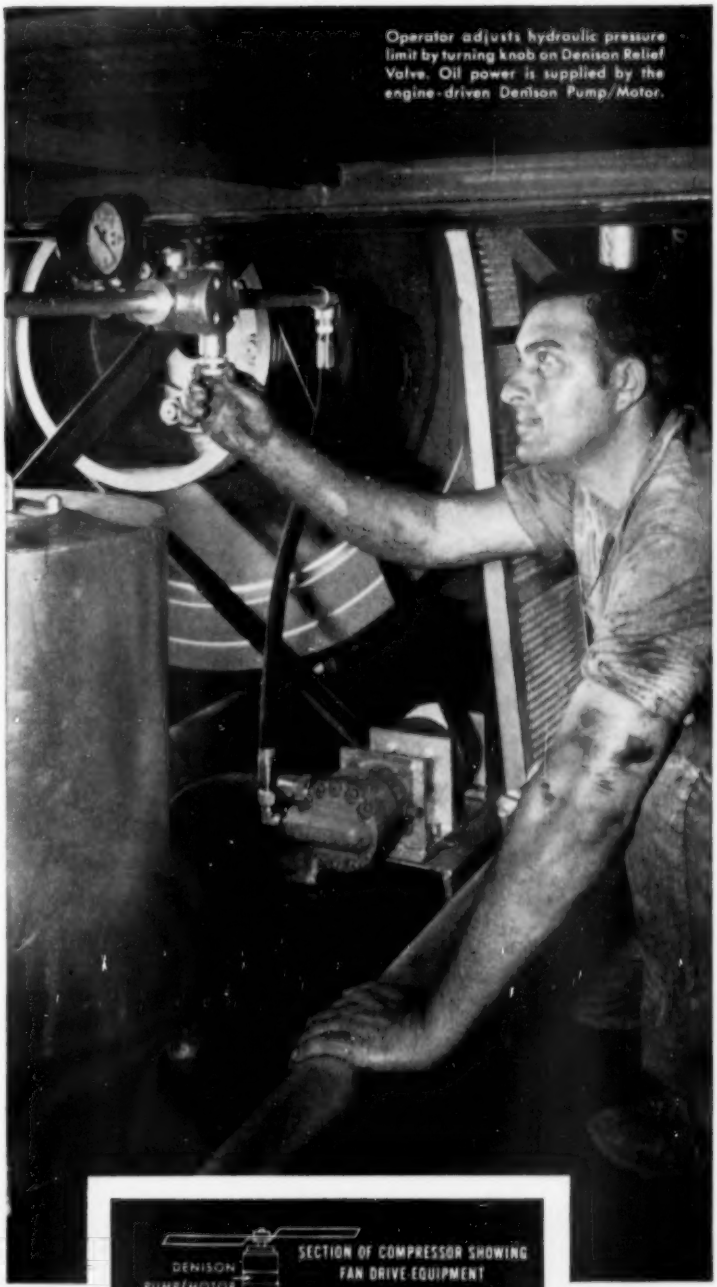
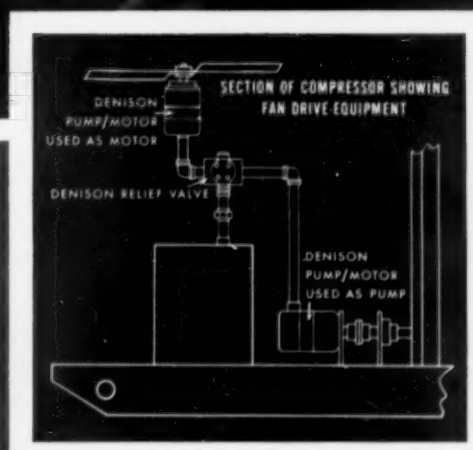


Operator adjusts hydraulic pressure limit by turning knob on Denison Relief Valve. Oil power is supplied by the engine-driven Denison Pump/Motor.


SECTION OF COMPRESSOR SHOWING FAN DRIVE EQUIPMENT
DENISON PUMP/MOTOR USED AS MOTOR
DENISON RELIEF VALVE
DENISON PUMP/MOTOR USED AS PUMP

New Life for Livingston No.8

RAPID LEVELING OF A DRILLING SITE is accomplished by this INTERNATIONAL TD-14A crawler tractor, owned by H. S. and B. Oil Field Construction, Wewoka, Oklahoma.

INTERNATIONAL TD-14A Helps Reclaim Damaged Well

When the pipe went bad on City Service Company's Livingston Number 8 well in the field outside of Seminole, Oklahoma, company engineers decided there was nothing to do but shut down operations and redrill.

Toughest part of the job was leveling and digging pits at the new drilling location. Although the hilltop site was dotted with big, deep concrete footings from the previous well, the INTERNATIONAL TD-14A crawler tractor owned by H. S. and B. Oil Field Construction leveled the area, rooted out the old footings and dug pits on the 200-square foot area in less than four days.

Like Hayes Streater, a partner in H. S. and B. Oil Field Construction, says:

"There's just no better oil field tractor than the INTERNATIONAL *TD-14A. If a pit can be dug, a TD-14A will do it. In fact, we can dig pits with straight up ends that other crawlers can't get out of.*

"And another thing: There's no crawler in the same horsepower field that can match the TD-14A for low cost maintenance and operation."

Your INTERNATIONAL Industrial Power Distributor will arrange a demonstration of any of the seven great crawler tractors in the INTERNATIONAL Industrial Power line.

A call to him today will put more profit in any earthmoving job you tackle tomorrow.

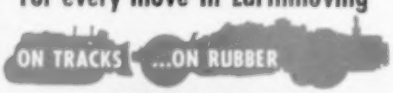
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

INTERNATIONAL

MAKES EVERY LOAD A PAYLOAD

INTERNATIONAL HARVESTER

For every move in Earthmoving



See INTERNATIONAL "Job-Phased" equipment

*Phased-Equipment — machines designed and built to handle each major phase of earthmoving most efficiently and economically.

showed a decline in June, output in this major oil country averaged 1,868,300 bbl. daily for the first 6 months for an increase of 5.9 per cent over the first half of 1953.

Trinidad sets record . . . Trinidad's crude output, averaging 64,500 bbl. daily in both May and June, is at a new record, slightly above the previous wartime peak.

Canadian production in June reflected a sharp seasonal increase, gaining 29,000 bbl. daily since May. In Alberta, production for the first 6 months averaged 218,624 bbl. daily while the June total was 244,290 bbl. daily.

Russian increase seen . . . The Russian Government recently published its first official report on industrial production in 1954, and the data given on petroleum indicated that Soviet output of crude oil will rise by slightly under 11 per cent this year as compared to 1953. This information indicates probable production in the Soviet Union during 1954 will amount to 58,300,000 metric tons, or about 1,165,000 bbl. daily.

A recent Soviet announcement said production is rising most rapidly in fields between the Volga and the Urals. In the first 6 months of this year, the Russian report said, 30 per cent more oil was produced in this region than in the same period of last year.

New Cuban Test Staked

Cuban American Oil Co. plans to spud wildcat this week near discovery which set off current exploration boom

CUBAN AMERICAN OIL CO. expects to spud its first wildcat in Cuba late this week, about 275 miles east of Havana.

Location for the test, the 1 Adelaide, has been staked in the island's central basin about 15 miles northeast of the little community of Sancti Spiritus. The site is about 6 miles northeast of the Jatibonico discovery near the Las Villas and Camaguey province boundary line which touched off the present exploration boom in the country.

Cuban American, which is headed by Tevis Morrow, Los Angeles, as president, holds an exploratory concession on 750,000 acres in Cuba. A large portion of the acreage surrounds the 25,000-acre block on which the Jatibonico well was brought in. The remainder is in the country's eastern basin.

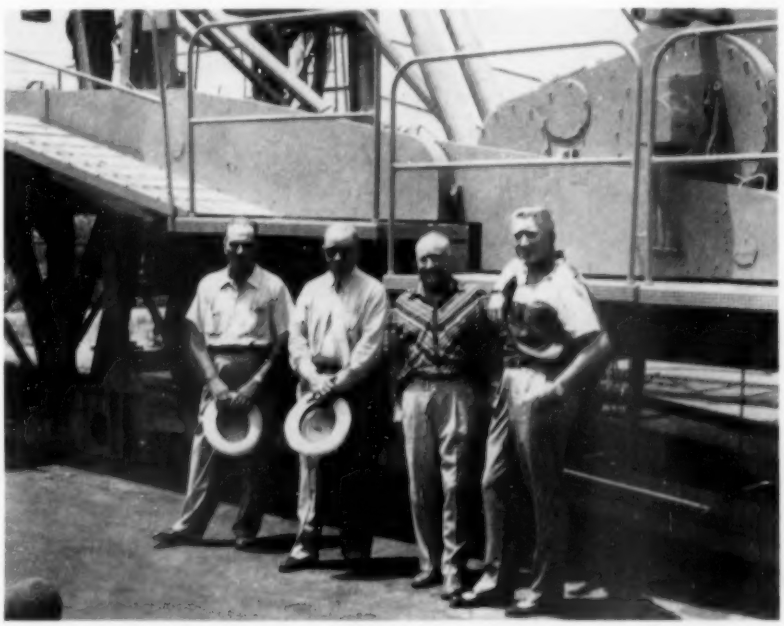
Morrow joined with the Grady Vaughn-H. W. Klein interests of Dallas to form Cuban American. Klein is executive vice president of the firm. Vice president is Grady Vaughn, Jr., and Ralph Maddox is secretary-treasurer.

The 1 Adelaide, tentatively projected to 4,500 ft., will be drilled by a rig and crew of Dixie Drilling Co., a Vaughn-Klein company with headquarters in Dallas. The rig, a modified Ideco H-40 "Rambler," is trailer-mounted and capable of drilling to about 10,000 ft.

The concession . . . The company, prior to spotting the first test, had two surface exploration parties active in Cuba. Field work began after the firm was organized following an agreement reached in June with Trans-Cuba Oil Co. and Cuban-Venezuelan Voting Trust, both Cuban national companies.

Together, these latter firms controlled 17,000,000 prospective oil acres in Cuba. For a Cuban American pledge to put up $1,500,000 in risk capital and to drill 40,000 ft. of hole, they agreed to turn over all prior geophysical and geological information assembled and permit the American firm to choose 750,000 acres from the total. Cuban American will own a 50 per cent interest in any production found. The company also holds an option to select a second 750,000 acres within a year from spudding of the first wildcat.

W. H. Cardwell, chief geologist for the Vaughn interests, who recently returned from Cuba, said the company will continue to keep one exploration party active in the country.



READY TO SPUD a new wildcat in Cuba is this Dixie Drilling Co. rig, shipped there from Houston to start explorations on a big block under concession to Cuban American Oil Co. Shown with the rig, left to right, are George McAnally, Dixie drilling superintendent; Grant Lindsay, vice president of Dixie; Ralph Maddox, secretary-treasurer of Cuban American and of Dixie; and H. W. Klein, president of Dixie and executive vice president of Cuban American.

Colombian Refinery Opened

The newly enlarged and modernized Barrancabermeja refinery in Colombia has been officially opened in ceremonies attended by Colombian President Gustavo Rojas Pinilla.

The new refinery has a capacity of 37,250 bbl. daily and includes a 15,130-bbl. daily fluid catalytic cracking unit, a 16,500 bbl. visbreaker, and acid-recovery, lubricating-oil and aviation-gasoline facilities *(The Oil and Gas Journal, May 3, page 80).*

The plant was acquired 3 years ago by the Colombian Government and turned over to a new government company, Empresa Colombiana de Petroleos, on expiration of the term of the old Tropical Oil Co. concession. It is now operated under lease by International Petroleum (Colombia) Ltd., a successor company to Tropical.

Modernization of the refinery was carried out by Foster Wheeler Corp. at a cost of about $38,000,000.

Iranian Terms Drafted

101-page document circulated for approval; shares still available to American firms interested in consortium

PREPARATIONS aimed at resuming Iranian oil operations and exports shortly after the first of October were moving forward last week.

Negotiations and legal experts in Teheran completed drafting of a 101-page document detailing terms of the August 5 settlement agreement. It was presented to the Iranian cabinet, and copies were flown to London, New York, Amsterdam, and Paris for approval by the boards of directors of the eight oil companies participating in the international consortium that will handle the operations and dispose of the production.

Long-standing reports that the 40 per cent American share in the consortium is open to additional United States companies were confirmed last week. In Teheran, Howard W. Page, chief consortium negotiator, said independents could buy in if the Iranian Government approved.

Tough purchase . . . Broadened American participation apparently is held back by several considerations.

One is the cost of $10,000,000 to Anglo-Iranian Oil Co., Ltd., for each per cent interest in the consortium. Of this $1,500,000 reportedly will be in cash and the remainder as a 10-cent a barrel override on oil taken.

Another factor is disposal of the production, particularly the products from the Abadan refinery. The present five American companies involved—Standard Oil Co. (N. J.), Standard Oil Co. of California, The Texas Co., Socony-Vacuum Oil Co., Inc., and Gulf Oil Corp.—all have substantial marketing interests in the Eastern Hemisphere.

Two new companies have been incorporated in the Netherlands and registered in Teheran as provided in the agreement. They are Iran Oil Refinery, and Iran Discovery & Exploitation Co., Ltd. These companies will control the operations, selling oil to subsidiaries of the individual consortium companies at cost plus a nominal fee.

It was announced in London that Anglo-Iranian has organized Oil Trading (Iran) Ltd., as its own Iranian oil subsidiary.

Early approval seen . . . Iranian Government officials said they will present the agreement to the Majlis (the lower house of the Iranian parliament) as soon as it has been approved by the boards of the consortium companies. So far little opposition appears to have developed, and speedy ratification is anticipated.

To save time, the agreement is due to be considered by the Majlis' combined finance and budget committees rather than by a special group. Petitions calling for early approval of the agreement were presented recently to the Majlis by merchants and civic groups in Teheran.

Mediterranean Stock Sold

California Texas Corp. (Caltex) has sold a 50 per cent stock interest in Mediterranean Refining Co. to Socony-Vacuum Overseas Supply Co.

Medreco is building a refinery at Beirut, Lebanon, to operate off Saudi Arabian crude oil delivered through the Tapline system. Caltex said the refinery is being constructed in accordance with the wishes of the Lebanese Government and under its convention with the government. Products will be distributed in the local area.

Medreco was a joint Socony-Vacuum-Caltex subsidiary in 1948 but was subsequently taken over by Caltex. Caltex's first plans for a 13,000 bbl. daily refinery at Sidon were scaled down to a 6,250-bbl. daily plant.

Initial crude arrives for . . .

. . . First Philippine Refinery

THE first oil refinery in the Philippines is being brought into operation by the Caltex organization on Batangas Bay in southern Luzon.

Initial shipment of crude oil for the plant was brought recently from Indonesia aboard the SS Caltex Manila. In Indonesia, the Caltex Group produces about 40,000 bbl. daily from Minas field.

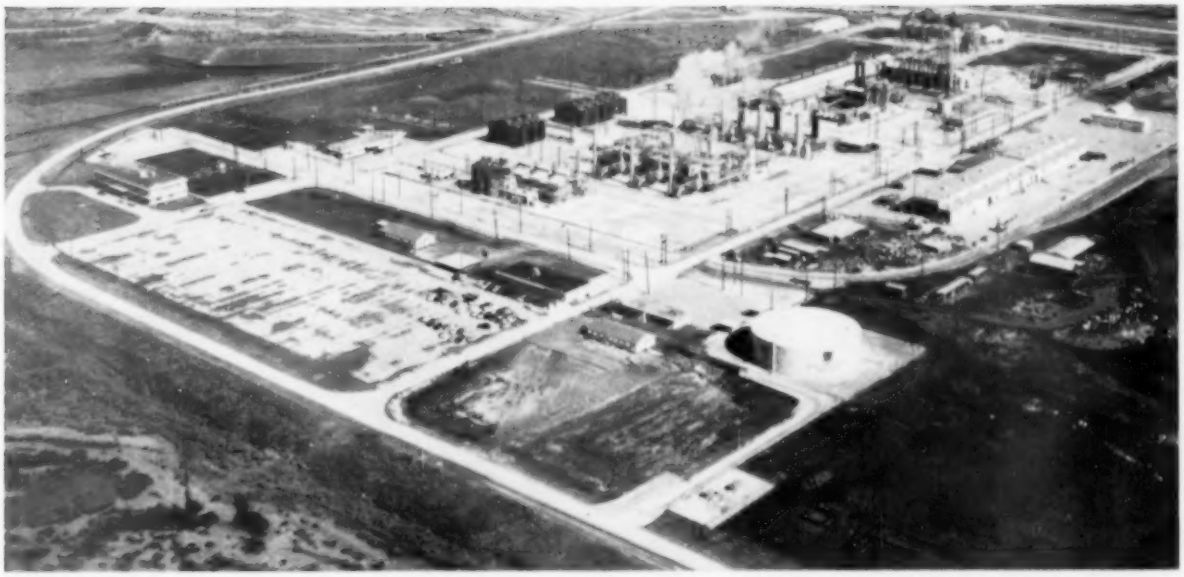
Formal inauguration for the Batangas refinery is scheduled for December 11. The distillation unit and most of the outside facilities are completed; the catalytic cracking unit is due to be finished in October.

Calendar-day charge rate for the Batangas facilities is 13,000 bbl. The process units provide 7,500 bbl. daily capacity in vacuum distillation, 5,400 fluid catalytic cracking, and 565 bbl. phosphoric acid catalytic polymerization. The facilities also include a propane decarbonization unit.

The new refinery cost about $30,000,000 and was erected under an agreement made by Caltex with the government under terms of the Philippine Petroleum Act of 1949. The government by presidential order made the refinery site a subport of entry open to both foreign and coastwise trade.

Prime contractor for the refinery is Foster Wheeler Corp. Although the first load of crude came from Indonesia, the design of the plant allows utilization of crude oil from a variety of sources.

The refinery is owned by the subsidiary, Caltex (Philippines) Inc., a Philippine corporation. Its construction reflects the group's interest in the Philippines market, which is one of the most important in the Far East.



AMMONIA . . . Phillips Petroleum Co.'s output of anhydrous ammonia was doubled with the recent completion of this new 450-ton per day plant by Phillips Chemical Co., wholly owned subsidiary, at its Adams Terminal chemical site on the Houston Ship Channel.

Petrochemicals . . . Today and Tomorrow

Natural gas and petroleum are raw materials for 25 per cent of all chemicals

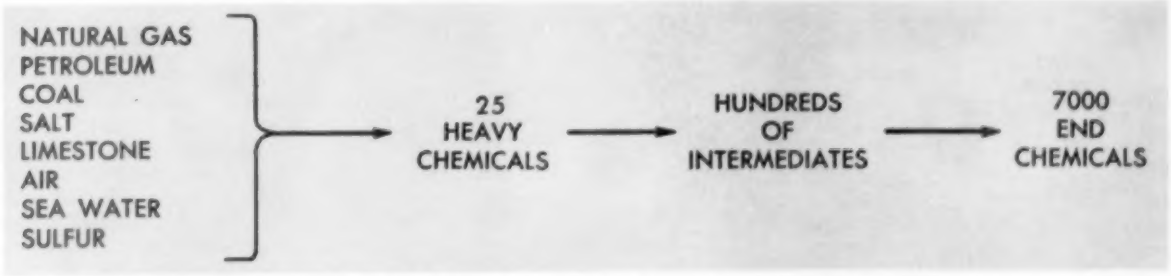
by John C. Reidel
Petrochemical Editor

THE chemical industry is best characterized by its great flexibility with regard to raw materials and processes. Along with flexibility go the words "change" and "diversification." The word "integration" might also be added to describe current activity in the industry.[1]

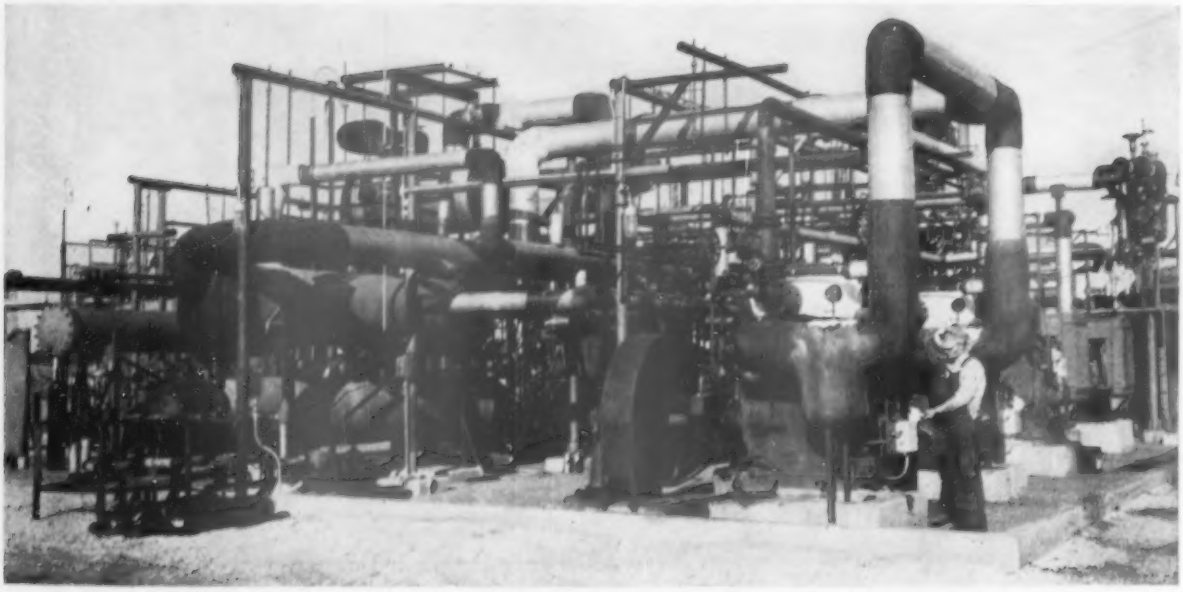
Some examples of what specific companies are doing by way of diversification will be given later. Results of such diversification in terms of products derived wholly or in part from natural gas or petroleum are listed in the 12-page tabulation which follows.

How many chemicals? . . . The number of new chemicals that can be produced is limited by how many research dollars the industry can or is willing to spend—on a total research budget of perhaps some $300,000,000, laboratories now develop about 10,000 new chemicals each year. Most of these get eliminated. Many are bounced rather early in the evaluation process. Some ring the bell. After many conferences and much sweat and agony, they are added to the list of commercial products.

Twenty-five per cent . . . Since this survey deals with petrochemicals, a good argument could be started at this point as to the exact definition of a "petrochemical." Whatever the outcome of such an argument the fact would still remain that natural gas and petroleum at present constitute a major raw-mate-



OIL AND GAS are major raw-material sources for chemicals. Fig. 1.



AROMATICS . . . Phillips Petroleum Co.'s new plant recently placed in operation at Big Spring, Tex., is designed to produce 5 million pounds annually of high-purity para-xylene for manufacture of a new synthetic fiber. This is the only plant producing 98 per cent minimum purity para-xylene in commercial quantities.

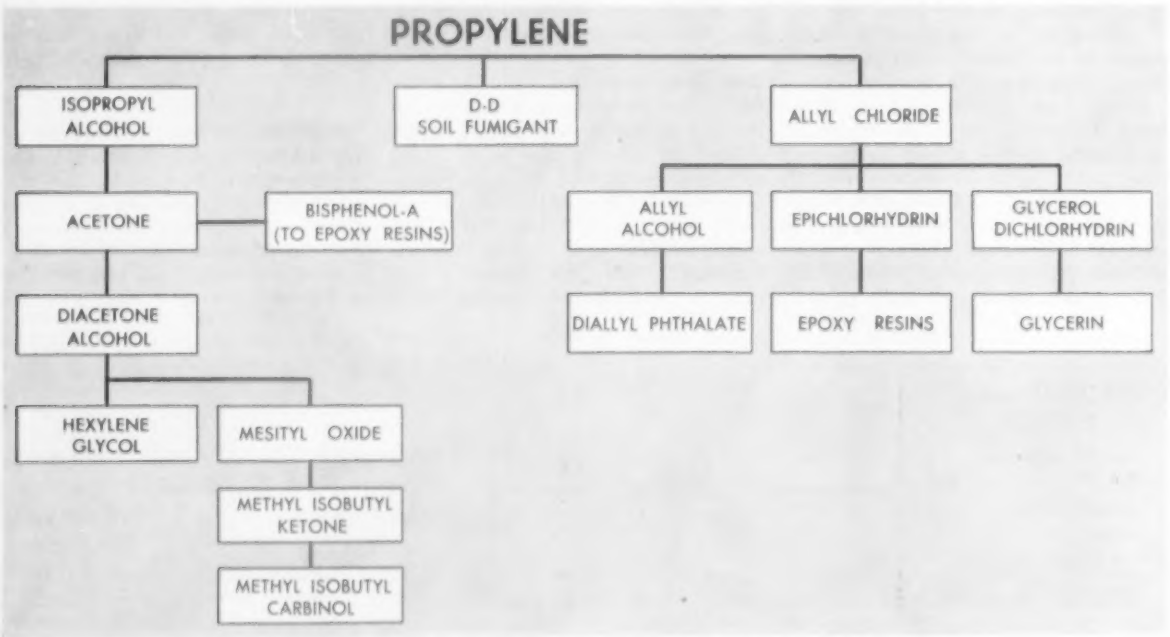
rials source for chemicals. It is well agreed now that some 25 per cent of total chemical production is based on this source and predictions are that this figure will go as high as 50 per cent within the next 10 years.[2,3]

Excess capacity? . . . For some products which are eminently petrochemical in origin the signs seem to say: "surplus capacity." Examples are ethylene glycol, ammonia, and polyethylene. A few have pointed to this with alarm. Majority industry opinion, however, is that these are short-term surpluses.

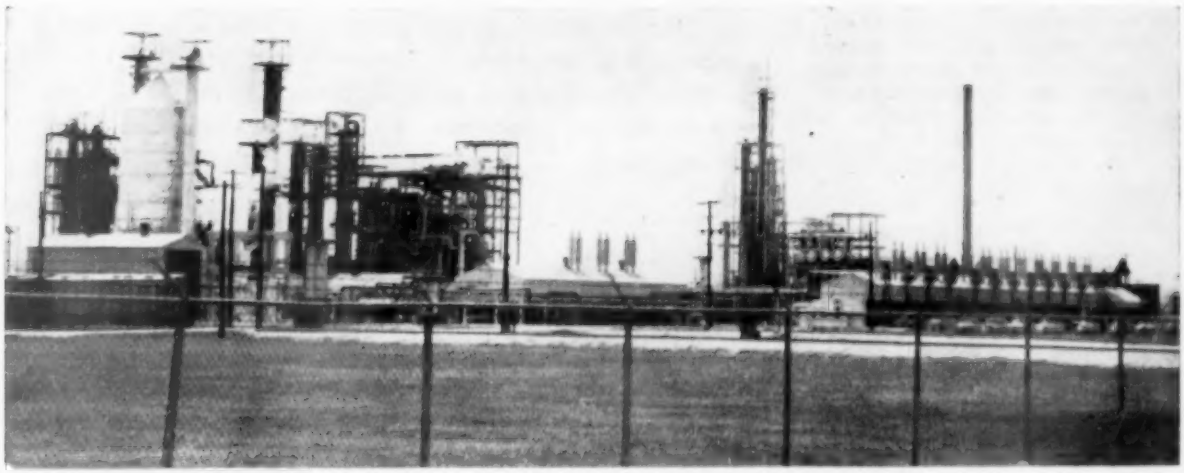
The counterreaction to temporary overcapacity is in swing and is naturally the kind of reaction to be expected in a competitive economy. One hears of it on all sides in such terms as "new attention to selling." Emphasis is on research, marketing, and sales as the three corners of a closely coordinated triangle. Emphasis is also on revamping of distribution systems and close attention to customer technical service.

In the case of polyethylene the problem of market development is not a simple one. However, investment now committed for polyethylene facilities is over $250,000,000. The title of a recent paper,[4] "Petrochemicals—Glamour Girl or Problem Child?" could certainly fit polyethylene at this time.

Uptrend follows dip . . . Tariff com-



HERE'S WHAT SHELL does with propylene at its Houston chemical plant. Fig. 2.



ETHYLENE DERIVATIVES . . . These are made at Jefferson Chemical Co.'s Port Neches, Tex., plant. Raw materials are ethane-ethylene and propane-propylene streams from The Texas Co.'s Port Arthur refinery. A propylene polymer stream is also used to make nonyl and dinonyl phenols and nonyl phenol condensates.

mission figures[5] showed production of crude products from petroleum and natural gas to be close to 7.9 billion pounds in 1952, as against 8.6 billion pounds in 1951. (After 1951 the Tariff Commission figures no longer included materials for motor-fuel blending, which accounted in part for the decline). Preliminary Tariff Commission figures for 1953 show a total of 10.8 billion pounds of petrochemical crudes.[6] "The revived production of basic aliphatics in 1953 (8.3 billion pounds) more than offset losses registered in 1952 and raised total petrochemical output to a figure closely approximating the generalized growth curve."

For the entire chemical industry capital investment for 1954 will be lower than for 1953. However, the Federal Reserve Board chemical production index showed a drop of only 0.7 per cent between March 1953 and March 1954, compared to a drop of 9 per cent in the over-all industrial index.

All Kinds of Competition

Flexibility in the chemical industry implies continuing and often complex interlocking competitive situations between raw materials, process, and products. The competition takes many and varied forms. There are usually several materials or processes to choose from.

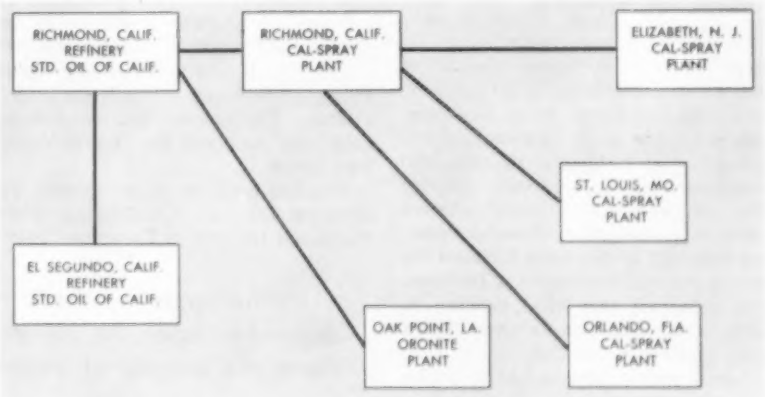
Coal hydrogenation . . . Two current developments must be mentioned. One is Carbide & Carbon's $11,000,000 experimental coal hydrogenation unit. In coal hydrogenation coal must be crushed and coal paste handled, and high pressures are involved. These disadvantages do not militate toward any imminent competition from this process. However, the potentialities for large-volume production of phenolics and other aromatics are very great as compared to byproduct coking of coal.[7]

Fischer-Tropsch . . . On the other side of the fence is Stanolind Oil & Gas Co.'s rehabilitation program for the Carthage Hydrocol plant. The partial oxidation of natural gas to form synthesis gas for reaction to oxygenated chemicals has been closely studied by Stanolind itself. It can be assumed that process and equipment bugs were fully uncovered in the attempt to achieve production before the Carthage plant was shut down. Measures required to eliminate these difficulties are now well known. Operation since February of the partial-oxidation units in Spencer Chemical's Vicksburg ammonia plant also leads to the conclusion that Fischer-Tropsch production based on natural gas will become a commercial reality.

The chemicals Stanolind expects to produce are listed in Table I of the survey which follows this article. It has been estimated[8] that in a Fischer-Tropsch plant making 7,000 bbl. per day of synthetic fuel (oil layer) water-soluble organics obtainable from the water layer would amount to some 150,000,000 lb. per year.

More competition . . . Other examples of competition in materials are between natural gas and L.P.G. as in manufacture of ethylene; between ethylene and acetylene as in manufacture of acrylonitrile; and between natural gas and carbide in making acetylene. The reader will find two current projects listed in Table I for acrylonitrile manufacture. One of these (American Cyanamid) is definitely based on natural-gas-derived acetylene. The other operation (that of Goodrich) is somewhat less clear at this writing although Goodrich does officially report natural gas as the raw material.

Competitive routes toward nylon manufacture provide another example.[9] These include: (1) petroleum cyclohex-


RICHMOND, CALIF. REFINERY STD. OIL OF CALIF.
RICHMOND, CALIF. CAL-SPRAY PLANT
ELIZABETH, N. J. CAL-SPRAY PLANT
ST. LOUIS, MO. CAL-SPRAY PLANT
EL SEGUNDO, CALIF. REFINERY STD. OIL OF CALIF.
OAK POINT, LA. ORONITE PLANT
ORLANDO, FLA. CAL-SPRAY PLANT

PETROCHEMICAL FAMILY of Standard Oil Co. of California. Fig. 3.

ane plus petroleum or coke-oven benzene, (2) the furfural route starting with corn cobs and oat hulls, and (3) starting with petroleum or natural gas via the butylene-butadiene or the ethylene-ethanol-butadiene route. The examples along this line or probably endless.[10]

Petrochemical Products Diversification

In the very simplest terms the chemical industry can be described as in Fig. 1. Large-tonnage end products are solvents, fertilizers, and plastics. Growth of the plastics industry for instance, has been an important factor in the increased demand for basic petrochemicals. The rule of thumb is that each $1 spent on new plants making plastics requires investment of $3-$4 in basic chemical capacity.

Ethylene . . . The spectacular boom in polyethylene, already mentioned and dealt with in some detail elsewhere in this issue, was a large factor in Gulf's decision to build a new 3-billion-cubic-feet per year ethylene plant at Port Arthur, Tex. But increased ethylene demand is also based on expansion in other less-spectacular directions. For example, Allied recently placed in operation an ethylene oxide-glycol plant at Orange, Tex. Part of Carbide's expenditure at Torrance, Calif., is also for ethylene oxide-glycol facilities, a possible indication that Carbide will not recycle unreacted ethylene, in making polyethylene at this location, but will convert it to the oxide-glycol. Incidentally, rumors that Carbide's Torrance project was being shelved have recently been scotched in an official announcement by the company.

The reader is referred to Table 1 to see what Carbide makes from ethylene (and also from acetylene). Companies listed in Table 1 making or using ethylene add up to an impressive total. (Care has been taken to note captive ethylene).

Figures for ethylene and propylene demand and production have been given elsewhere.[11,12,13]

Propylene . . . A prime example of product diversification is afforded by Shell Chemical Corp. What Shell does with propylene at its Houston plant is shown in Fig. 2. Shell at Houston also makes ethyl alcohol and ethyl chloride from ethylene and sec-butyl alcohol and methyl ethyl ketone from butylenes. The first and to date only facilities for making glycerin are located at Houston. It is estimated that Shell supplies as much as 25 per cent of total United States glycerin production.

Epoxy resins, production of which began late in 1950, provided another notable Shell diversification. Most important use of epichlorohydrin at Houston is for manufacture of these resins. Epoxies go into finishes and into adhesives that will bond glass to brass, plastic to steel, and has also been introduced for metal-to-metal bonding.

Latest Shell products are the insecticide, Dieldrin, a chlorinated hydrocarbon, and limited commercial production was begun of allyl glycidyl ether, glycerol allyl ether, and glycidyl phenyl ether. Announcement was also made of pilot-plant work with tert-butylbenzoic acid.

Synthetic detergents . . . These accounted for 53 per cent of a total detergent market (including soap) amounting to nearly 3.6 billion pounds in 1953. An important raw material for alkyl aryl sulfonate-type detergent is propylene tetramer (dodecene). Continental Oil Co. has expanded rapidly and provides an example of integration in this field. Following purchase of a sulfonation plant in Chicago, Conoco acquired Bryton Chemical Co., at Trainer, Pa. These two are supplied with raw material (dodecyl benzene and other stocks) for sulfonation to oil-soluble and water-soluble detergents. Recently Conoco began construction on four new terminals to improve its distribution system.

Aromatics . . . The outlook for benzene, toluene, and xylenes has been covered previously.[14] Since then petroleum B.T.X. capacity has been augmented, notably by Sun Oil Co.'s large Marcus Hook plant.[15] Sinclair's plant, also at Marcus Hook, for production of toluene and p-xylene is due to go on stream next spring. P-xylene has received much attention as the chief building block for the polyester fiber Dacron. The intermediate, terephthalic acid, also goes into the new polyester film Mylar.

The first p-xylene plant was built by Standard Oil Co. of California at its Richmond refinery in December 1949. Later, a second plant was built at the El Segundo refinery. Standard of California provides another example of diversification. A good part of its production is in aromatics. The first phenol-from-cumene plant in this country was built at Richmond. Latest expansion has been announced as a 50,000,000-lb. per year isophthalic acid plant. The Socal petrochemical family is shown in Fig. 3. Oronite is primarily a marketing company but does operate the additives plant at Oak Point, La. California Spray Chemical Corp.'s products are in the insecticides field. To show what is involved on the research, distribution, sales and technical service side of such a business, Cal-Spray lists, in addition to the four liquid formulating plants (Fig. 3), 2 research laboratories, 11 field research laboratories, 43 dust plants, 15 district offices, and 45 branch offices.

"The industry cannot stand still, because in some respects it is like a funnel. Research and innovation pour in new products and new processes at the top, while chemicals and processes rendered obsolete drain out at the bottom" . . .

William H. Ward, vice president,
E. I. du Pont de Nemours & Co.

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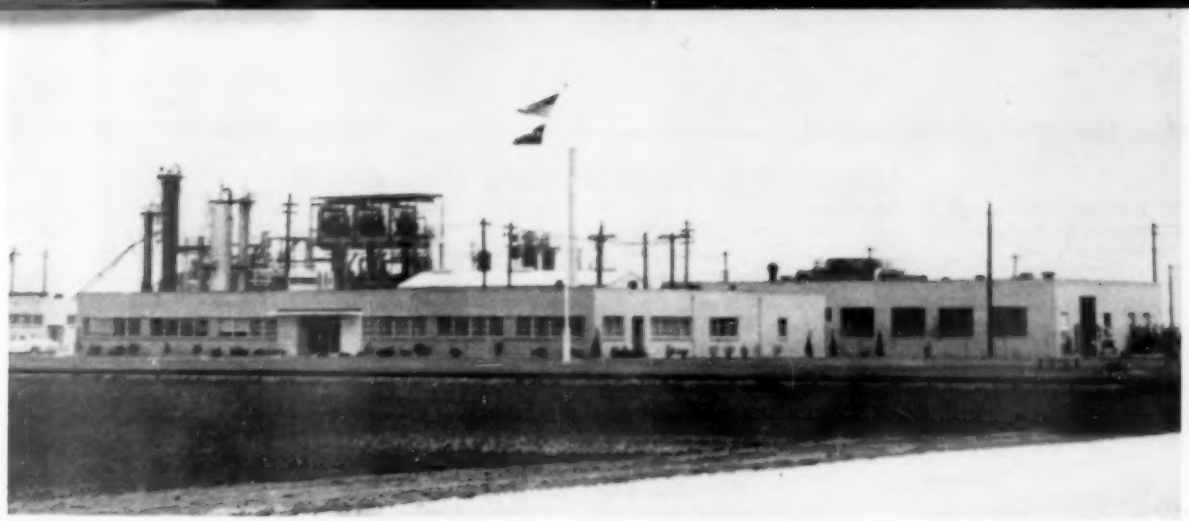
"Plastomers (synthetic resins, fibers and rubber) are dependent upon the use of organic raw materials. Today these are largely of petrochemical origin. . ."

J. D. Fennebresque, vice president,
Celanese Corp. of America.



Allied Chemical & Dye Corp.'s new $5,000,000 plant at Orange, Tex. The plant obtains ethylene through a 22-mile pipeline from Gulf Oil Corp. at Port Arthur. Allied's nitrogen division is planning additional facilities at this location to manufacture ethanolamines.

Table 1 – U. S. Organic Petrochemical Plants

Company, location, and raw materials—	Principal products
Advance Solvents & Chemical Corp.,	
Jersey City, N. J.	
Petroleum naphthenic acid, petroleum fractions	Metallic naphthenates, polybutenes, E.P. oil additives, esters of dibasic acids and fatty acids.
Alox Corp.,	
Niagara Falls, N. Y.	
Petroleum fractions	Oxygenated petroleum chemicals (for rust preventives), lube-oil additives, some special high-melting-point blending agents (for manufacture of carbon paper and floor polishes).
Allied Chemical & Dye Corp.,	
Barrett Div., Frankford, Pa.	
Propane-butane blend	Phenol and acetone.
National Aniline Div., Buffalo, N. Y.	
Kerosine fraction; white-oil fraction	Alkyl aryl sulfonates (water soluble); long-chain alkyl aryl sulfonates (oil soluble); dodecylbenzene.
Nitrogen Div., Orange, Tex.	
Ethylene	Ethylene glycol and ethylene oxide.
South Point, Ohio	
Natural gas	Ammonia, urea, methanol, formaldehyde urea-formaldehyde concentrate.
Solvay Process Div., Moundsville, W. Va.	
Methane (natural gas)	Methyl chloride, methylene chloride, chloroform, carbon tetrachloride.
Hydrogen (derived from methane)	Hydrogen chloride.
Semet-Solvay Div., Buffalo, N. Y.	
Ethylene (from residual-oil fraction)	High-melting-point polyethylene wax.
American Cyanamid Co.,	
Avondale, La. (Fortier plant)	
Natural gas	Ammonia, hydrocyanic acid, acrylonitrile, ammonium sulfate. (Acetylene made at Avondale from natural gas is used internally.)
Warners, N. J.	
Petroleum fractions	Oil-layer-type petroleum sulfonate (barium salt).
Atlantic Refining Co.,	
Philadelphia	
Crude petroleum fractions, refinery gases, and solvent extracts	Aromatic distillates and solvents, crude carbolates, sodium phenolate, crude cresylic acid, propane, butylenes, diisobutylene, technical eicosane, nonene, triisobutylene, crude mercaptans, alkylbenzene, nonyl dodecylbenzene, dodecylbenzenesulfonic acid type of water-soluble alkyl aryl sulfonates, sulfonated petroleum aromatic compounds including oil-layer-type petroleum sulfonates (barium salt and sodium salt).
Philadelphia	
Asphalt	Thermoplastic resin.
Philadelphia	
Detergent alkylate	Sulfonated detergents.
Atreco, Tex.	
Detergent alkylate	Sulfonated detergents.
Atlas Processing Co.,	
Shreveport, La.	
Naphtha (400° F. e.p.) from natural-gas extraction	Benzene.
Bryton Chemical Corp.	
(See Continental Oil Co.)	
Brea Chemicals, Inc.	
(See Union Oil Co.)	

TABLE 1—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
California-Spray Chemical Co., Richmond, Calif. (Subs. Standard Oil Co. of Calif.)	
Petroleum bases	n-Trichloromethylthiotetrahydrophthalimide; n-butyl, 2,4-dichlorophenoxyacetate; ispropyl, 2,4-dichlorophenoxy-acetic acid (diethanolamine, isopropanolamine and triethanolamine salts); tetrahydrofurfuryl 2,4,5-trichlorophenoxyacetate; tetraethyl pyrophosphate (TEPP); ethylene glycol mono-oleate.
Carbide & Carbon Chemicals Co. (Div. of Union Carbide & Carbon Corp.) South Charleston, W. Va.	
Natural gas, refinery gases, crude oil, other petroleum fractions	Acetaldehyde, acetaldol, acetic acid, acetic anhydride, acetoacetanilide, acetoacet-o-chloranilide, acetoacet-o-toluidide, acetonitrile, acetophenone, n-acetyl ethanolamine, allethrin, amines, aminoethyl morpholine, butadiene, butoxy ethoxy propanol, n-butyl acetate, n-butyl alcohol, n-butyl amine, n-butyl ethanolamine, n-butyl ether, butyraldehyde, butyric acid, butyric anhydride, caproic acid, crotonaldehyde, dehydranone, diacetone alcohol, dibutoxy tetraglycol, dibutyl amine, dibutyl maleate, dichlorethyl ether, dichlorethyl formal, dichlorisopropyl ether, diethanolamine, diethoxy tetrahydrofuran, diethyl amine, diethyl ethanolamine, n,n-diethyl ethylene diamine, diethyl ketone, diethyl maleate, 2,2-diethyl-1,3-propanediol, diethyl succinate, diethyl sulfate, diethylene glycol, diethylene glycol monobutyl ether, diethylene glycol monoethyl ether acetate, diethylene glycol monoethyl ether, diethylene glycol dibutyl ether, diethylene glycol diethyl ether, diethylene glycol monomethyl ether, di-2-ethylhexyl adipate, di (2-ethylhexyl) amine, di (2-ethylhexyl) maleate, diisobutyl carbinol, diisopropanolamine, diketene, dimethyl isopropanolamine, dioxane, dipropylene glycol, ethanol, β-ethoxypropionaldehyde, ethoxytriglycol, ethyl acetate, ethyl acetoacetate, ethyl acrylate, ethyl amine, ethyl n-butyl ether, ethyl butyl ketone, n-ethyl ethanolamine, ethyl ether, ethyl β-ethoxypropionate, ethyl formate, ethyl silicate, 2-ethyl 2-butyl propanediol-1,3, 2-ethylbutyraldehyde, 2-ethylbutyric acid, ethylene carbonate, ethylene chlorhydrin, ethylene dichloride, ethylene glycol, ethylene glycol monobutyl ether, ethylene glycol monoethyl ether, ethylene glycol monoethyl ether acetate, ethylene glycol dibutyl ether, ethylene glycol monoethyl ether, ethylene glycol monomethyl ether acetate, 2-ethylhexanediol-1,3, 2-ethylhexoic acid, 2-ethylhexyl acetate, 2-ethylhexyl amine, 2-ethylhexyl chloride, glycol diacetate, glycol diformate, glyoxal, heptadecanol, n-hexyl solvent, n-hexyl ether, hexylene glycol, hydroxyethyl cellulose, isobutanol, isopropanol, isopropanolamine, isopropenyl acetate, isopropyl acetate, isopropyl amine, isopropyl ether, 2-mercaptoethanol, methanol, methoxy polyethylene glycols, methoxy triglycol acetate, methyl acetone, methyl amyl acetate, methyl amyl alcohol, n-methyl diethanolamine, methyl isobutyl ketone, n-methyl morpholine, monoethanolamine, monoisopropanolamine, morpholine, pentanedione-2,4, phenyl diethanolamine, phenyl ethanolamine, phenyl ethyl ethanolamine, phenyl methyl ethanolamine, n-phenyl morpholine, plasticizers such as dioctyl phthalate, and other plasticizer components, polyethylene plastic, polyethylene glycols, polypropylene glycols, propionic anhydride, propylene chlorhydrin, propylene diamine, propylene dichloride, propylene glycol, propylene oxide, pyruvic aldehyde, surface-active agents (sodium heptadecyl sulfate and others), tetradecanol, tetraethanol ammonium hydroxide, thiodiglycol, trichlorethane, triethanolamine, triethyl amine, triethylene glycol, triglycol dichloride, triisopropanolamine, trimethyl cyclohexanol, trimethyl nonanol, synthetic lubricants, undecanol, vinyl isobutyl ether.
Institute, W. Va.	
Natural gas and other petroleum streams	Acetaldehyde, acetic acid, acetic anhydride, acetone, acetonitrile, acetophenone, acrolein, acrylonitrile, n-butyl alcohol, butyric acid, butyric anhydride, diethylene glycol diisobutyl ketone, ethyl n-butyl ether, 2-ethylbutanol, ethylene glycol, ethylene oxide, 2-ethylhexanol, n-hexanol, isophorone, isopropanol, maleic anhydride, mesityl oxide, methyl acetone, 2-methyl-5-ethyl pyridine, methyl isobutyl ketone, paraldehyde, plasticizers, α-picoline, γ-picoline, polyethylene glycols, propionic anhydride, trimethyl nonanone-4.
Texas City, Tex.	
Natural gas, refinery gases (ethane, propane)	Acetaldehyde, acetic acid, acetic anhydride, acetone, 2-aminoethyl ethanolamine, butadiene, n-butyl acetate, n-butyl alcohol, diethylene glycol, diethylene triamine, ethanol, ethyl acetate, ethylene diamine, ethylene dichloride, ethylene glycol, ethylene oxide, isobutanol, isopropanol, isopropyl acetate, methanol, methyl acetone, methyl isobutyl ketone, tetraethylene pentamine, trichlorethane, triethylene tertamine, vinyl acetate, vinyl chloride, other vinyl resins and vinyl plastic materials. (Acetylene made from natural gas and ethylene made from natural gas and/or refinery gases, ethane, propane, at Texas City are used internally.)
Texas City, Tex.	
Ethylene	Polyethylene.
Whiting, Ind.	
Refinery gases	Acetic anhydride, acetone, ethanol, ethylene oxide and ethylene glycol, isopropanol, methyl ethyl ketone, and methyl isobutyl ketone.
Torrance, Calif. (completion, end 1955)	
Refinery cracked gases (ethylene)	Polyethylene, ethylene oxide and ethylene glycol.
Seadrift, Tex. (completion, summer 1954)	
Natural gas (ethane)	Ethylene oxide, polyethylene.
Carlisle Chemical Works, Inc., Reading, Ohio	
Petroleum fractions	Sulfurized petroleum fractions (components for cutting oils and lubricants), petroleum sulfonate, oil emulsifiers (for soluble cutting oils).
Carthage Hydrocol, Inc., (Wholly owned subsidiary of Standard Oil & Gas Co. Plant being rehabilitated) Brownsville, Tex.	
Natural gas	Synthesis gas, chemicals (see Stanolind Oil & Gas Co.).

TABLE 1—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
Celanese Corp. of America,	
Bishop, Tex.	
Natural gas, liquefied petroleum gases (propane and butanes)	Propylene oxide, propylene glycol, dipropylene glycol, 1,3-butylene glycol, 2,3-butylene glycol, acetone, methanol, formaldehyde, formaldehyde solutions in alcohols, paraformaldehyde, trioxane, acetaldehyde, acetic acid, n-propanol, isobutanol, n-butyl alcohol, special solvents, n-propyl acetate, pentaerythritol.
Pampa, Tex.	
Natural gas, liquefied petroleum gases (propane and butanes)	Propionic acid, methanol, acetone, acetic acid, acetic anhydride, vinyl acetate, n-propyl acetate, n-butyl acetate, butyric acid, methyl acetone, acetate methylal.
Newark, N. J.	
Petroleum cresylic acid, petroleum derived phenol, dibutyl alcohol, dioctyl alcohol	Tricresyl phosphate, mixed esters, triphenyl phosphate, dibutyl phthalate, dioctyl phthalate.
Chemstrand Corp. (Monsanto Chemical Co. and American Viscose Corp.)	
Decatur, Ala.	
Acrylonitrile	Acrylic fibers.
Pensacola, Fla.	
Petroleum base stocks	Nylon.
Cities Service Oil Co.,	
Oklahoma City	
Natural gas	Crude mixtures—methanol, acetaldehyde, formaldehyde, and acetone.
Tallant, Okla.	
Natural gas	Formaldehyde, paraformaldehyde, acetone, antifreeze chemicals, acetaldehyde, methyl-acetone type solvents—e.g., methyl acetone acetal, methanol.
Lake Charles, La. (Govt. rubber plant)	
Petroleum feed stocks	1,3-Butadiene (grade for elastomers); 1-butene, 2-butene and mixtures.
Columbia-Southern Chemical Corp. (Subs. of Pittsburgh Plate Glass Corp.)	
Natrium, W. Va.	
Benzene	Chlorinated benzenes, benzene hexachloride.
Barberton, Ohio	
Propane	Perchloroethylene.
Commercial Solvents Corp.,	
Peoria, Ill.	
Natural-gas fractions	Nitroethane, nitromethane, 1-nitropropane, 2-nitropropane, 2-nitro 1-butanol.
Sterlington, La.	
Natural gas	Ammonia, ammonium nitrate, nitrogen solutions; methanol (from hydrogen and carbon monoxide).
Continental Oil Co.,	
Baltimore	
Propylene tetramer and benzene	Alkyl aryl sulfonating stocks, including dodecylbenzene.
Chicago	
Dodecylbenzene	Water-soluble surface-active sulfonates including liquid, slurried, drum-dried, and spray-dried stocks, (dodecylbenzenesulfonic acid type).
Ponca City, Okla.	
Naphtha fraction; propylene	Benzene, toluene; propylene tetramer.
Trainer, Pa. (Bryton Chem. Corp.)	
Alkyl-aryl sulfonating feed stock	Oil-soluble surface-active sulfonates (lubricating-oil detergent additive, fuel-oil additives).
Westlake, La.	
Naphtha fraction	Benzene, toluene.
Propylene	Propylene tetramer.
Copolymer Corp.,	
(Govt. rubber plant)	
Petroleum base stocks	1,3-Butadiene (grade for elastomers).
Cosden Petroleum Corp.,	
Big Spring, Tex.	
Naphtha fractions	Benzene, toluene, xylene.
Portions of doctor and caustic treating solutions	Ethyl and butyl mercaptans (odorants).
Big Spring, Tex. (Cosden operator—see Phillips Chemical Co.)	
Xylenes mixture	p-Xylene separation plant.
Crown Central Petroleum Corp.,	
Pasadena, Tex.	
Refinery gas stream	Ethylene and propylene (extracted by Shell Chemical Co.).
Diamond Alkali Co.,	
Pasadena, Tex. (Deer Park plant)	
Ethylene	Perchloroethylene, vinyl chloride, and polyvinyl chloride.
Pasadena, Tex. (Green's Bayou plant)	
Benzene	Benzene hexachloride, DDT, and lindane.
Dow Chemical Co. (See also Ethyl-Dow Chemical Co.)	
Freeport, Tex.	
Natural gas (major feed stock) liquefied petroleum gases, and benzene	Ethylene and propylene oxides; ethylene, propylene, diethylene, dipropylene, tetraethylene, triethylene, and tripropylene glycols; carbon tetrachloride; chloroform; dichloroethyl, dichloroisopropyl ether; styrene, ethyl benzene; ethyl, methyl and methylene chlorides; vinyl and vinylidene chlorides; ethylene, ethylidene, and propylene dichlorides; methyl chloroform; perchlorethylene; butadiene, styrene-butadiene latex. (Some ethylene goes to Ethyl-Dow.)

TABLE 1—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
Freeport, Tex. (under construction)	
Ethylene	Polyethylene.
Midland, Mich.	
Crude oil and natural gas	Ethylene, propylene, styrene, butadiene, 1,3-butadiene (grade for elastomers), butadiene-butylene mixtures, methyl styrene, ethylene glycol, ethyl benzene, ethyl chloride, ethylene dibromide, diethylbenzene, polystyrene, divinylbenzene, ethylene dichloride, dichlorethyl ether, ethylene oxide, mono, di, triethanolamines, ethylene diamine, i-propylbenzene (cumene), i-propyl chloride, propylene oxide, propylene glycol, propylene dichloride, i-propanolamines, toluene 2°, polyglycols, glycol ethers, styrene-butadiene latex, saran, polyvinyl chloride, vinyltoluene. (Ethylene and propylene made from natural gas at Midland is used internally.)
Pittsburg, Calif.	
Natural gas	Methylene chloride, methyl chloride, chloroform carbon tet, perchlorethylene.
Torrance, Calif. (Govt. rubber plant), Styrene Div.	
Petroleum base stock	Benzene, 100 per cent, toluene 2°, ethylene, butadiene and butylene mixtures, heavy hydrocarbon mixtures and polymers, propylene, ethylbenzene, styrene.
Allyn's Point, Conn.	
Styrene	Polystyrene.
E. I. du Pont de Nemours & Co., Inc. (List given here is considerably abbreviated; du Pont makes some petrochemicals in nearly all its plants)	
Orange, Tex.	
Ammonia, natural gas, propane, benzene, cyclohexane, and adiponitrile	Methanol, polyethylene, adipic acid, hexamethylenediamine. (Ethylene made at Orange from natural gas and/or propane is used internally.)
La Porte, Tex.	
Ammonia, methanol	Carbamate fungicides, methylamines, dimethyl formamide.
Victoria, Tex.	
Natural gas, butadiene, ammonia (small amount)	Adiponitrile (nylon salt basic).
Memphis, Tenn.	
Natural gas	Hydrogen cyanide and sodium cyanide.
Eastern States Petroleum Co., Inc., Houston	
Refinery streams	Butylenes (1-butene, 2-butene and mixtures, isobutylene), propane, n-butane, isobutane, isopentane.
Eastern States Chemical Corp., Houston	
Naphtha fractions	Benzene-2°, various aromatic solvents.
Eastman Kodak Co., Rochester, N. Y. (See Tennessee Eastman and Texas Eastman)	
Enjay Co., Inc. (See Esso Standard Oil Co.)	
Esso Standard Oil Co., Baton Rouge, La.	
Refinery gas streams (ethylene, propylene, butylenes), petroleum fractions	Aromatic distillates and solvents; aromatic tars, ethane and ethylene, propane and propylene, 1,3-butadiene, isobutylene, isoprene, tripropylene, ethanol, isopropanol, isooctyl alcohol, decyl alcohol, tridecyl alcohol, ethyl ether, isopropyl ether, dicyclopentadiene, benzene, butyl rubber, tetrapropylene, acetone (from isopropyl alcohol), petroleum resin.
Linden, N. J.	
Refinery streams	Naphthenic acids, isobutylene, diisobutylene, polyisobutylenes, isopropanol, sec.-butanol, isopropyl acetate, sec.-butyl acetate, methyl ethyl ketone, acetone, isopropyl ether, oil soluble petroleum sulfonates (sodium salt), lube oil additives.
Ethyl Corp., Baton Rouge, La.	
Ethane, ethylene, benzene (ethylene dibromide from Ethyl-Dow)	Tetraethyl lead, ethyl chloride, ethylene dichloride, technical benzene hexachloride, high-gamma benzene hexachloride, lindane.
Pasadena, Tex.	
Ethylene (ethylene dibromide from Ethyl-Dow)	Tetraethyl lead, ethyl chloride, ethylene dichloride.
Ethyl-Dow Chemical Co., Inc., Freeport, Tex. (See Dow Chemical Co.)	
Ethylene	Ethylene dibromide.
Firestone Plastics Co., Pottstown, Pa. (Firestone Tire & Rubber Co.)	
Petroleum base stocks	Polybutadiene-acrylonitrile-type (N-type) acyclic elastomers; polybutadiene-styrene-type acyclic elastomers; vinyl resins.
Food Machinery & Chemical Corp. (See Ohio-Apex Div.)	
Foster-Grant Co., Baton Rouge, La.	
Benzene, ethylene (From Esso Standard Oil Co. refinery)	Styrene.

TABLE 1—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
Leominster, Mass.	
Styrene	Polystyrene.
General Petroleum Corp.,	
Torrance, Calif.	
Refinery streams	Sodium cresylic sludge; crude naphthenic acids (transported to Vernon, Calif., plant for processing into highly refined naphthenic acids and metallic naphthenates).
General Tire & Rubber Co.,	
Mogadore, Ohio	
Petroleum base stocks	Polybutadiene-styrene-vinylpyridine-type acyclic elastomers.
Ashtabula, Ohio	
Petroleum base stocks	Polyvinyl chloride.
Globe Oil & Refining Corp. (now Pure Oil Co.),	
Lemont, Ill.	
Spent caustic solution	Cresylic acid.
B. F. Goodrich Chemical Co.,	
Avon Lake, Ohio	
Acetone	Ketone.
Formaldehyde	Propiolactone, acrylic acid.
Petroleum base stocks	Polybutadiene-acrylonitrile (N type) acyclic elastomers.
Calvert City, Ky. (completion early 1955)	
Natural gas	Acrylonitrile, hydrogen. Also uses acetylene from Air Reduction Co.'s carbide plant.
Louisville, Ky.	
Propane gas	Hydrogen.
Goodyear Tire & Rubber Co.,	
Akron, Ohio (Chemical Div.)	
Petroleum base stocks	Butadiene-acrylonitrile (N type) elastomers, (rubbers and latices); high-styrene-type resins (point bases, rubber reinforcers, molding resins); styrenated products.
Great Southern Chemical Corp., (Pontiac Refining Corp., The Chicago Corp., La Gloria Oil & Gas Corp., and Gulf Oil Corp.)	
Corpus Christi, Tex.	
Butane	Butylene concentrate.
Corpus Christi, Tex.	
Naphtha fractions	Benzene, toluene, and xylene.
Griffin Chemical Co.,	
Richmond, Calif.	
Petroleum fractions	Naphthenic acid, petroleum sulfonates (emulsifying agents).
Gulf Oil Corp.,	
Port Arthur, Tex.	
Refinery gases, heptene, other refinery streams	Ethylene, isooctyl alcohol, naphthenic acids, 1-butene, 2-butene and mixtures. (Ethylene facilities being expanded by 3,000 M.M.c.f. per year; completion first quarter 1955).
Hercures Powder Co.,	
Gibbstown, N. J. (Completion, Oct. 1954)	
Propylene, benzene	Phenol, acetone, cumene, cumene hydroperoxide, acetophenene, α-methylstyrene.
Heyden Chemical Corp.	
(See Monsanto Chemical Co.)	
Humble Oil & Refining Co.,	
Baytown, Tex.	
Refinery streams	Toluene, solvent xylene, paraxylene, high-boiling aromatic solvents, narrow-boiling range aliphatic naphtha (hexane, heptane, and octane), special naphthas, cyclohexane, H_2S concentrate for sulfur manufacture and carbon black feed stock.
Indoil Chemical Co.	
(See Standard Oil Co. of Indiana)	
Jefferson Chemical Co., Inc.,	
Port Arthur, Tex.	
Refinery gases (ethane-ethylene and propane-propylene streams from The Texas Co. Port Arthur plant); propylene polymer from The Texas Co. and phenol	Ethylene oxide, ethylene glycol, diethylene glycol, ethylene dichloride, mono, di, and triethanolamines, ethylene carbonate, propylene carbonate, morpholine, hydroxyethyl morpholine, ethylene glycol ethers, diethylene glycol ethers, polyethylene glycols, triethylene glycol, nonyl and dinonyl phenols, ethylene oxide—nonyl phenol condensates, butyl glycol ethers, methyl glycol ethers. (Ethylene made at Port Arthur from refinery gases and/or L.P.G. is used internally.)
Kendall Refining Co.,	
Bradford, Pa.	
Petroleum fractions	Heavy hydrocarbons (petroleum polymer and condensation resins).
Koppers Co., Inc. (Chemical Div.),	
Port Arthur, Tex.	
Ethylene	Ethylbenzene.
Port Arthur, Tex. (completion, late 1955)	
Ethylene	Polyethylene.
Kobuta, Pa.	
Ethylbenzene	Styrene, polystyrene.
Oil City, Pa.	
Petroleum fractions	Di-tert-butyl-para-cresol (oil additive and antioxidant), other alkylated phenols and cresols.

TABLE 1—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
Lubrizol Corp.,	
Pasadena, Tex.	
Petroleum fractions	Petroleum sulfonates (barium and calcium salts) and other lube-oil additives.
Cleveland	
Petroleum fractions	Petroleum sulfonates (barium and calcium salts) and other lube-oil additives.
Magnolia Petroleum Co.,	
Beaumont, Tex.	
Petroleum fractions	Cresylic acid, sodium cresylate solutions.
Mathieson Chemical Corp.,	
Brandenburg, Ky.	
Natural gas liquids (ethane) from Tennessee Gas Transmission Co. low-temperature liquids extraction plants at Greensburg, Ky.	Ethylene oxide, ethylene glycol, diethylene glycol, triethylene glycol, ethyl dichloride, and dichlorethyl ether, aromatic distillates and solvents. (Ethylene made at Brandenburg is used internally.)
Morgantown, W. Va. (completion date indefinite)	
Cyclohexane	Caprolactam.
Merichem Co.,	
Greens Bayou, Tex.	
Refinery byproduct streams	Cresylic acid, sodium sulfide.
Monsanto Chemical Co.,	
Texas City, Tex.	
Natural gas and propane, benzene	Ethylbenzene, styrene, ethylene dichloride, vinyl chloride, acrylonitrile, hydrogen cyanide; toluene-2° is small byproduct stream. (Acetylene from natural gas and ethylene from natural gas and/or propane made at Texas City are used internally.)
Texas City, Tex. (under construction)	
Ethylene	Polyethylene.
Texas City, Tex.	
(Heyden Chemical Corp., part owner; plant under construction)	
Byproduct hydrogen and carbon monoxide from acetylene synthesis	Methanol.
Montrose Chemical Co.,	
Newark, N. J.	
Petroleum cresylic acid	Tricresyl phosphate.
National Petrochemicals Corp. (National Distillers Products Corp. and Panhandle Eastern Pipeline Co.)	
Tuscola, Ill.	
Natural gas (ethane) (natural-gas liquids extraction plant in Tuscola)	Ethanol, ethyl ether and ethyl chloride. (Ethylene made at Tuscola is used internally.)
Tuscola, Ill. (completion, April 1955)	
Ethylene	Polyethylene.
Natural Gas Odorizing Co., Inc.,	
Houston	
Petroleum fractions	Ethyl, higher mercaptans.
Neches Butane Products Co.,	
(Govt. owned rubber plant)	
Petroleum feed stocks	1,3-Butadiene (grade for elastomers).
Naugatuck Chemical Co.	
(See U. S. Rubber Co.)	
Neville Chemical Co.,	
Neville Island, Pa.	
Unsaturated petroleum fractions	Aromatic petroleum solvents, oxidizing resins, and thermoplastic resins.
Anaheim, Calif.	
Unsaturated petroleum fractions	Aromatic petroleum solvents, oxidizing resins, and thermoplastic resins.
Oil & Chemical Products, Inc.	
(See Refiner Processors, Ltd.)	
Ohio-Apex Div., Food Machinery & Chemical Co.	
Nitro, W. Va.	
Petroleum cresylic acid	Tricresyl phosphate. (Plant also makes plasticizers such as diisooctyl phthalate and diallyl phthalate monomer from isooctyl, allyl and other alcohols.)
Oronite Chemical Co. (See also Standard Oil Co. of Calif.)	
Oak Point, La. (expansion doubling capacity completed August 1954)	
Petroleum base stocks	Lube-oil additives, furnace-oil additive, gas odorants, nonionic detergents, algicides, alkyl phenols.
Pan American Refining Corp.,	
Texas City, Tex.	
Petroleum base stocks	Benzene-2° toluene, xylenes, hydrocarbon resins (petroleum polymer and condensation resins), aromatic solvents, drying oils, alkylated naphthalene, nonene, dicyclopentadiene, 1-butene, 2-butene (mixtures).
Pan-Am Southern Corp. (Subs. Standard Oil Co. of Ind.)	
El Dorado, Ark.	
Refinery streams	Propylene tetramer, polybutenes.

TABLE 1—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
Pennsylvania Industrial Chemical Corp., Chester, Pa.	
Petroleum base stocks	Petroleum polymer and condensation resins.
Petrocarbon Chemicals, Inc., Irving, Tex.	
Catalytic reformate (from naphtha fractions)	Benzene, toluene, xylenes.
Petrochemicals Co., Long Beach, Calif.	
Petroleum fractions	Alkyl aryl sulfonates, aromatic solvents.
Phillips Chemical Co. (Subs. Phillips Petroleum Co.)	
Pasadena, Tex	
Acetaldehyde	Methylethylpyridine, methylvinylpyridine, mixed pyridines.
Pasadena, Tex. (under construction)	
Ethylene	Polyethylene (semiworks, low-pressure process).
Phillips (Borger), Tex. (Govt. owned butadiene and synthetic rubber plants)	
Petroleum feed streams (n-butane)	1,3-Butadiene (grade for elastomers), 1-butene, 2-butene and mixtures, butylene concentrates, methyl butenes.
Big Spring, Tex. (Cosden operator)	
Mixed xylenes	p-Xylene.
Phillips Petroleum Co., Phillips (Borger), Tex.	
Petroleum fractions	Propylene, butylenes, butadiene, isopentane, n-pentane, methylpentanes n-hexane, cyclohexane, isoheptanes, n-heptane, mixed octanes, isooctanes, propylene tetramer, tert-butyl mercaptan, tert-dodecyl mercaptan, odorless thinner, rubber chemical, special pitch.
Productol Co., Santa Fe Springs, Calif.	
Refinery byproduct fractions	Phenols, cresols, cresylic acids.
Pure Oil Co., Smiths Bluff, Tex.	
Petroleum fractions; refinery gas streams	Petroleum polymer and condensation resins, solvents, nonparaffin concentrates, refinery gas stream (to Neches Butane Products Co.), 1-butene, 2-butene and mixtures.
Toledo	
Petroleum fractions	Solvents, toluene-2°, xylene (aviation grade) and heavy mixed aromatics and polymers.
Cabin Creek, W. Va.	
Refinery gas streams (propane, n-butane)	Gas stream (to Carbide & Carbon Chemical Co., South Charleston).
Midland, Mich	
Petroleum fractions	Solvents.
Refinery Processors, Inc., and Oil Chemical Products, Inc.	
Galena Park, Tex.	
Petroleum fractions	Benzene, toluene, xylene, aromatic solvent naphthas, odorless paint thinners, DDT base.
Richfield Oil Corp., Wilmington, Calif.	
Petroleum fractions	Naphthenic acids.
Wilmington, Calif.	
Refinery cracked gases	Ethylene-ethane stream.
Reilly Tar & Chemical Corp., Indianapolis, Ind.	
Petroleum fractions	Phenols and cresols.
Republic Oil Refining Co., Texas City, Tex.	
Refinery gas streams	Butane, butylene, propane, and ethylene.
Rohm & Haas Co., Pasadena, Tex.	
Carbon monoxide, alcohols (acetylene is from carbide)	Acrylic manomers (methyl and ethyl acrylates).
Hydrogen cyanide (from natural gas and ammonia), acetone	Acetone cyanohydrin.
Roosevelt Oil & Refining Corp., Mount Pleasant, Mich.	
Naphtha fraction	Benzene, toluene, aromatics, aliphatic naphthas and solvents.
Sharples Chemicals, Inc., Wyandotte, Mich.	
Pentane, pentane fractions, triisobutylene	Amyl alcohol, amyl chloride, amyl acetate, amyl phenols, amyl naphthalenes, tertiary-dodecyl mercaptans, and tertiary-dodecylthioether, 1 and 2-pentene and mixed pentenes.
Shell Chemical Corp., Houston (Deer Park), Tex.	
Petroleum streams (propylene, ethylene, butylenes)	Acetone, diacetone alcohol, ethyl alcohol, hexylene glycol, isopropyl alcohol, isopropyl ether, mesityl oxide, methyl ethyl ketone, methyl isobutyl carbinol, methyl isobutyl ketone, sec-butyl alcohol, allyl alcohol, allyl choride, epichorohydrin, ethyl chloride, glycerin, diallyl phthalate, epoxy resins (condensation polymers of epichlorohydrin and bisphenol); D-D soil fumigant (chlorinated C_3 hydrocarbons); glycerol dichlorohydrin, trichloropropane, bisphenol-A, glycidyl phenyl ether.

TABLE I—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
Dominguez, Calif.	
Petroleum hydrocarbons	Isopropyl alcohol, acetone, methyl ethyl ketone, methyl isobutyl ketone, diacetone alcohol, sec-butyl alcohol, mesityl oxide.
Martinez, Calif.	
Petroleum hydrocarbons	Isopropyl alcohol, acetone, methyl ethyl ketone, diacetone alcohol, methyl isobutyl ketone, ethyl amyl ketone, sec-butyl alcohol, tert-butyl alcohol, methyl isobutyl carbinol, trisubstituted phenol (antioxidant), p-tert-butylbenzene acid. Sodium sulfonates (for lube-oil additives) fuel-oil additive.
Julius Hyman & Co. (Subsidiary Shell Chemical Corp.)	
Denver, Colo.	
Petroleum hydrocarbons	Insecticides and agricultural chemicals (aldrin, dieldrin, endrin).
Norco, La. (completion early 1955)	
Petroleum hydrocarbons	Crude chlorohydrins, allyl chloride, D-D.
Shell Oil Co.,	
Houston, Tex.	
Naphtha fractions	Benzene-2°, toluene-2°.
Refinery streams	Propane and propylene; 1-butene, 2-butene and mixtures.
Martinez, Calif.	
Refinery streams	Cresylic acid, crude naphthenic acids, propane and propylene; 1-butene, 2-butene and mixtures; oil-layer-type petroleum sulfonate (sodium salt). (Hydrogen-rich tail gas from cat reformer to go to Pittsburg, Calif., plant for ammonia manufacture.)
Wilmington, Calif.	
Petroleum streams	Xylene-3°, mixed xylenes, propane and propylene, 1-butene, 2-butene and mixtures, cyclohexane.
Wood River, Ill.	
Naphtha fractions	Toluene, xylenes.
Sinclair Refining Co. (Sinclair Chemicals, Inc.),	
East Chicago, Ind.	
Petroleum fractions	Antioxidants, aromatic solvents, gear-oil additives, turbine-oil additives, cutting-oil additives, cresylic acids.
Sand Springs, Okla.	
Petroleum fractions	Demulsifying agents, corrosion inhibitors, acid-layer-type petroleum sulfonate (sodium salt), and oil-layer-type petroleum sulfonate (sodium salt).
Marcus Hook, Pa.	
Petroleum streams	Dodecene, and cresylic acids.
Marcus Hook, Pa. (completion, spring 1955)	
Catalytic reformate	Aromatic hydrocarbons (toluene, p-xylene, xylene solvents, heavy aromatic solvents).
Houston	
Petroleum fractions	Oil-layer-type petroleum sulfonates, (barium, calcium and sodium salts), corrosion inhibitors, isoparaffinic odorless solvents, cresylic acids.
Houston (Govt.-owned rubber plant)	
Petroleum feed stocks	Butadiene.
Corpus Christi, Tex.	
Petroleum fractions	Aromatic solvents.
Wood River, Ill.	
Petroleum fractions	Aromatic solvents.
Wellsville, N. Y.	
Petroleum fractions	Petroleum resins.
Skelly Oil Co.,	
Eunice, N. M.	
Natural gas	Ethyl mercaptan and propyl mercaptan.
L. Sonneborn Sons, Inc.,	
Petrolia, Pa.	
Petroleum fractions	Oil-layer-type petroleum sulfonate (sodium salt), water-soluble petroleum sulfonate.
Socony-Vacuum Oil Co., Inc.,	
Paulsboro, N. J.	
Petroleum fractions	Oil-layer-type petroleum sulfonates, sodium cresylate solutions, sodium sulfide solutions (for paper manufacture).
Buffalo	
Petroleum fractions	Sodium sulfide solution.
Spencer Chemical Co.,	
Pittsburg, Kans.	
Natural gas (hydrogen and carbon monoxide)	Methanol.
Calumet City, Ill.	
Methanol and ammonia	Formaldehyde and hexamine (hexamethylenetetramine).
Orange, Tex. (completion, spring 1955)	
Ethylene	Polyethylene.
Standard Oil Co. of California (See also Oronite Chemical Co. and California-Spray Chemical Co.)	
Richmond, Calif.	
Petroleum base stocks	Ortho and paraxylenes, industrial xylenes, alkyl aromatic detergents, metallic naphthenates and naphthenic acids, cresylic acids, petroleum sulfonates, polybutenes, gas odorants, ethyl mercaptan, phthalic anhydride, phenol, acetone.
El Segundo, Calif.	
Petroleum base stocks	Benzene, toluene, paraxylene, cumene butadiene-butylene mixtures, 1-butene, 2-butene and mixtures. (Isophthalic acid plant has been announced by Standard of California with production scheduled for second quarter 1955).

TABLE 1—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
Standard Oil Co. (Ind.),	
Sugar Creek, Mo.	
Petroleum fractions	C_7 olefin concentrate, sodium cresylate.
Wood River, Ill.	
Heptene heartcut from olefin feed and other petroleum refinery fractions	Isooctyl, nonyl, or higher alcohols; polybutene and higher molecular weight, hydrocarbons (lube-oil detergents and petroleum base plasticizers).
Whiting, Ind.	
Petroleum fractions	Benzene-2*; solvent-grade toluene; xylenes; acid-layer-type petroleum sulfonates; oil-layer-type petroleum sulfonate; sodium cresylate; cresylic acid, refined; detergent alkylate. (Supplies refinery gases to Carbide & Carbon Chemical Co.)
Stanolind Oil & Gas Co.,	
Brownsville, Tex. (Plant shut down pending rehabilitation of Carthage Hydrocol)	
Fischer-Tropsch synthesis products	Acetaldehyde, acetic acid, acetone, n-butanol, butric acid, ethanol, isopropanol, methanol, methyl ethyl ketone, methyl propyl ketone, methyl butyl ketone, propionaldehyde, propionic acid, n-propanol. (Raw material from Carthage Hydrocol.)
Stauffer Chemical Co.,	
Louisville, Ky.	
Propane	Carbon tetrachloride, perchlorethylene, and hydrogen chloride.
Sun Oil Co.,	
Toledo	
Refinery streams	n-Butylenes, propylene tetramer (dodecene), propylene trimer (nonene).
Marcus Hook, Pa.	
Refinery fractions	Oil-layer-type petroleum sulfonates, naphthenic acids, propylene tetramer (dodecene), and propylene trimer (nonene).
Marcus Hook, Pa.	
Naphtha fractions	Benzene, toluene, and xylenes.
Sunray Oil Corp.,	
Duncan, Okla.	
Refinery gases	Propylene tetramer.
Texas Co., The,	
Port Arthur, Tex.	
Refinery fractions	Naphthenic acid, oil-layer-type petroleum sulfonates; ethane-ethylene stream; propane-propylene mixture; 1-butene, 2-butene, and mixtures; heavy hydrocarbons; dodecene (tetrapropylene), nonene (tripropylene).
Tennessee Eastman Co. (Div. of Eastman Kodak Co.)	
Kingsport, Tenn.	
Ethanol, isobutyraldehyde, normal-butyraldehyde, isobutyl alcohol, and 2-ethylhexyl alcohol	Acetic and butyric acids and anhydrides, acetaldehyde, acetanilide, n-butyl acetate, crotonaldehyde, dibutyl phthalate, diethyl phthalate, di (2-ethylhexyl) phthalate, di-2-ethylhexyl adipate, diisobutyl adipate, di-2-ethylhexyl sebacate, diisobutyl phthalate, ethyl acetate, isobutyl acetate, isopropyl acetate, and triethyl phosphate.
Acetic and butyric acids and anhydrides	Cellulose esters (to acetate yarn and staple), acetate plastic, and acetate butyrate plastic.
Texas Eastman Co. (Div. of Eastman Kodak Co.)	
Longview, Tex.	
Propane and natural gas	Ethanol, isobutyraldehyde, butyraldehyde, isobutyl alcohol and 2-ethylhexyl alcohol; ethylene and propylene; aromatic distillates and solvents.
Longview, Tex. (under construction)	
Ethylene	Polyethylene.
Union Oil Co. of California,	
Wilmington, Calif.	
Refinery gases and wastes	Methyl and ethyl mercaptans.
U. S. Rubber Co. (Naugatuck Chemical Div.),	
Naugatuck, Conn.	
Styrene, phthalic anhydride, maleic anhydride, ethylene glycol and other polyhydride alcohols and dibasic acids	Polyesters.
Butadiene and styrene	Rubber reinforcing resins, water-base paint latices.
Butadiene, acrylonitrile, styrene	Resin rubber mixtures for high impact plastics.
Baton Rouge, La.	
Butadiene and acrylonitrile	Polybutadiene-acrylonitrile-type (N type) acyclic elastomer.
Styrene, butadiene, acrylonitrile	Styrene-resin-nitrile rubber blends.
Universal Detergents, Inc.,	
Long Beach, Calif.	
Petroleum fractions	Alkyl aryl sulfonates, aromatic solvents.
Velsicol Corp.,	
Marshall, Ill.	
Petroleum base stocks	Benzene-1*; benzene-motor grade; toluenes; xylenes; high-boiling aromatic hydrocarbon solvents, hydrocarbon polymers and resins.
Visco Products Co.,	
Sugarland, Tex.	
Petroleum fractions; petroleum chemicals	Crude-oil desalting and dehydrating chemicals; special oxyalkylated compounds.

TABLE 1—U. S. ORGANIC PETROCHEMICAL PLANTS (Continued)

Company, location, and raw materials—	Principal products
Anaheim, Calif. (under construction)	
Petroleum fractions; petroleum chemicals	Crude-oil desalting and dehydrating chemicals.
Warren Petroleum Corp.,	
Conroe, Tex.	
Liquefied petroleum gas (propane, butane)	Pentaerythiotol, methanol, and acetaldehyde.
Witco Chemical Co.,	
Chicago	
Petroleum naphthenic acid	Metallic naphthenates (paint drying agents and lube additives).
Petroleum wax	Cracking inhibitors (rubber compounding).
Asphalt fractions	Rubber extenders, saturating compounds.
Perth Amboy, N. J.	
Solid petroleum tar; heavy-liquid and semisolid petroleum fractions	Rubber extender, extending plasticizer; rubber softeners.
Lawrenceville, Ill.	
Same as Perth Amboy plant	Same as Perth Amboy plant.
Wyandotte Chemicals Corp.,	
Wyandotte, Mich.	
Petroleum fractions	Alkyl aryl sulfonates, ethylene glycol, diethylene glycol, ethylene dichloride, polyoxyalkylene compounds, chloroethers, aromatic distillation and solvents (chlorinated solvents).

TABLE 2—U. S. SULFUR-CONVERSION PLANTS

From Sour Natural Gas

Plants and location—

Columbian Carbon Co., Seminola, Tex.
Continental Sulphur & Phosphate Corp., Thermopolis, Wyo. (under construction).
Gulf Oil Corp. (Waddell gasoline plant), Crane County, Texas.
Imperial Sulphur & Acid Co., Farmington, N. M.
Jefferson Lake Sulphur Co., Needville, Tex.; Manderson, Wyo. (under construction, completion autumn 1954).
Mathieson Chemical Co., Stamps, Ark.
Odessa Natural Gasoline Co.-Sid Richardson, Odessa, Tex.
Phillips Chemical Co., Crane County, Texas; Goldsmith, Tex.
Seaboard Oil Co., Silvertip, Wyo.
Stanolind Oil & Gas Co., North Cowden, Tex.; Slaughter, Tex.; Elk Basin, Wyo.
Sid Richardson Carbon Co., Keystone, Tex.; Kermit, Tex.
Warren Petroleum Corp., Monument, N. M.

From Refinery Gases

Plants and location—

Allied Chemical & Dye Corp., El Segundo, Calif.; Richmond, Calif.
Atlantic Refining Co., Philadelphia, Pa.
Cities Service Refining Corp., Lake Charles, La.
Consolidated Chemical Industries, Inc., Baton Rouge, La.; Baytown, Tex.
Freeport Sulphur Co., Westville, N. J.
General Petroleum Corp., Torrance, Calif., (hydrogen sulfide in commercial amine solution).
Globe Oil & Refining Co. (see Pure Oil Co.).
Gulf Oil Corp., Port Arthur, Tex. (ODM certificate, $1,100,000 for Philadelphia plant.)
Hancock Chemical Co., Wilmington, Calif., (under construction).
Hancock Oil Co., Long Beach, Calif., (hydrogen sulfide in foul amine solution).
Pure Oil Co., Lemont, Ill.
Shamrock Oil & Gas Corp., Sunray, Tex.
Shell Chemical Corp., Houston (Deer Park), Tex.
Sinclair Refining Co., Marcus Hook, Pa.; Houston, Tex., (under construction).
Standard Oil Co. (Ind.), Whiting, Ind.
Texas Gulf Sulfur Co., Worland, Wyo. (Pure Oil Co. furnishes acid gas stream).
The Texas Co., Port Arthur, Tex.

TABLE 3—U. S. NITROGEN CHEMICAL MANUFACTURERS

(Hydrogen for ammonia synthesis manufactured from natural gas except where otherwise noted. Basic plant capacities are given in standard tons per day of anhydrous ammonia)

Plant and location—

Allied Chemical & Dye Corp., Nitrogen Div.,
Hopewell, Va. (475 tons per day; new additions to bring capacity to 550 tons per day)
Ammonia, urea, ammonium nitrate, nitrogen solutions including ammonium nitrate-ammonia and urea-ammonium nitrate-ammonia, sodium nitrate and nitrogen tetroxide.
South Point, Ohio (150 tons per day; expansion under way)
Ammonia, urea, ammonium nitrate, nitrate solution, methanol, formaldehyde, urea-formaldehyde concentrate.
La Platte, Neb. (200 tons per day)
Ammonia, urea, nitrogen solutions.

American Cyanamid Co.,
Avondale, La. (Fortier plant; capacity doubled to over 300 tons per day)
Ammonia, ammonium sulfate.

Atlantic Refining Co.,
Philadelphia, Pa. (plant on stream June 1954; 100 tons per day)
Ammonia (uses byproduct hydrogen from cat reformer in Atlantic's Philadelphia refinery).

Brea Chemicals, Inc. (Subsidiary of Union Oil Co. of California),
Brea, Calif. (plant in operation May 1954; 235 tons per day)
Ammonia. Dry ice and liquid CO_2, 70 tons per day. Nitric acid and ammonium nitrate plant in engineering stage. Ammonium phosphate facilities under construction. (Union Oil Co. operates plant making dry ice and liquid CO_2, from high-CO_2-content natural gas, at Santa Maria, Calif., capacity 50 tons per day; also recovers ammonium sulfate from refinery gases and wastes at Wilmington, Calif., capacity 50 tons per day.)

Columbia River Chemicals, Inc., (affiliate of Pacific Chemicals, Ltd., of Calgary),
Pasco, Wash. (completion latter part 1955)
Ammonia, 160 tons per day; 110 tons urea, 140 tons ammonium sulfate daily. (Plant to be designed for generation of hydrogen from Bunker C fuel oil; design will also make possible uses of natural gas when it becomes available in area.)

Commercial Solvents Corp.,
Sterlington, La. (400 tons per day)
Ammonia, ammonium nitrate, nitrogen solutions; methanol.

Cooperative Farm Chemicals Association,
Lawrence, Kans. (plant completion October 1954; 180 tons per day)
Ammonia, ammonium nitrate, and nitrogen solutions.

Deere & Co. (Grand River Chemical Div.),
Pryor, Okla. (completion August 1954; 180 tons per day)
Ammonia, urea (275 tons per day).

General Petroleum Corp.,
Torrance, Calif.
Ammonium sulfate (10 tons per day) from refinery streams.

Grace Chemical Co. (W. R. Grace & Co.),
Woodstock, Tenn. (completion 1954; 250 tons per day)
Ammonia; urea.

Hercules Powder Co.,
Hercules (Pinole), Calif. (140 tons per day)
Ammonia.

Union Oil Co., Wilmington, Calif. (Plant at Oleum, Calif., in engineering stage.)
Westvaco Chemical, South Charleston, W. Va.
Wilshire Oil Co., Norwalk, Calif.

TABLE 4—U. S. BUTADIENE PLANTS
(Based on petroleum feed stock)

Government Owned

Plants and location—
Cities Service Refining Corp., Lake Charles, La.
Copolymer Corp., Baton Rouge, La.
Humble Oil & Refining Co., Baytown, Tex.
Neches Butane Products Co., Port Neches, Tex.
Phillips Chemical Co., Borger, Tex.
Shell Chemical Corp., Torrance, Calif.
Standard Oil Co. of California, El Segundo, Calif.
Sinclair Rubber, Inc., Houston.

Privately Owned

Plants and location—
Carbide & Carbon, South Charleston, W. Va.; Texas City, Tex.
Dow Chemical Co., Midland, Mich.
Esso Standard Oil Co., Baton Rouge, La.

Under consideration—Petroleum Chemicals, Inc. (Cities Service Co. and Continental Oil Co.) to build butyl rubber plant, possibly at Lake Charles, La. Texas Butadiene & Chemical Corp. (Warren Petroleum Corp., Fluor Corp., Loeb Rhoades & Co., William R. Staats & Co., Wertheim & Co.) to build butadiene plant on Gulf Coast.

TABLE 5—U. S. CARBON-BLACK PLANTS

Furnace Process

Plants and location—
Cabot Carbon Co., Guymon, Okla.; Ville Platte, La.; Pampa, Tex.; Big Spring, Tex.
Columbian Carbon Co., Conroe, Tex.; Fairbanks, Tex.; Fortune, Tex.; Seagraves, Tex.; Eola, La.; Hancock, La.; Hickok, Kans.; El Dorado, Ark.; North Bend, La. (under construction, completion November 1954).
Continental Blacks, Inc., Ponca City, Okla.
Continental Carbon Co., Sunray, Tex.
Continental Oil Black Co., Westlake, La.
J. M. Huber Corp., Baytown, Tex.; Borger, Tex.
Phillips Chemical Co., Borger, Tex.
Shell Chemical Corp., Pittsburg, Calif.
Thermatomic Carbon Co., Sterlington, La.
United Carbon Co., Inc.; Aransas Pass, Tex.; Shamrock, Tex.; Ryus, Kans.

Channel Process

Plants and location—
Barnhart Hydrocarbon Corp., Big Lake, Tex.
Cabot Carbon Co., Skellytown, Tex.; Pampa, Tex.; Monahans, Tex.; Kermit, Tex.; Hobbs, N. M.
Carbon Blacks, nc., Rayville, La.
Coltexo Corp., Lefors, Tex.
Columbian Carbon Co., Kingsmill, Tex.; Corpus Christi, Tex.; Seagraves, Tex.; Sunray, Tex.; Eunice, N. M.
Continental Carbon Co., Eunice, N. M.; Sunray, Tex.
J. M. Huber Corp., Borger, Tex.
Peerless Carbon Black Co., Ulysses, Kans.; Pampa, Tex.
Sid Richardson Carbon Co., Odessa, Tex.
United Carbon Co., Inc., Aransas Pass, Tex.; Falfurrias, Tex.; Rayville, La.; Stinnett, Tex.

Roller Process

Plant and location—
Peerless Carbon Black Co., Sweeny, Tex.

TABLE 3—U. S. NITROGEN CHEMICAL MANUFACTURERS (Continued)

Louisiana, Mo.
Ammonia (government facility leased and operated by Hercules).
Lion Oil Co.,
El Dorado, Ark. (570 tons per day)
Ammonia; ammonium nitrate, ammonium sulfate; nitrogen solutions, aqua ammonia.
Luling, La. (Barton plant; 300 tons per day)
Ammonia; ammonium nitrate. Plant for 42 tons daily of solid (dry ice) and liquid CO_2 to be completed in September 1954).
Mathieson Chemical Corp.,
Lake Charles, La. (250 tons per day)
Ammonia.
Matholin Corp. (Mathieson Chemical Corp. and Olin Industries, Inc.),
Lake Charles, La.
Hydrazine.
Mississippi Chemical Corp.,
Yazoo City, Miss. (180 tons per day; expansion to be completed July 1955)
Ammonia; ammonium nitrate. (Completion of present expansion will raise daily capacity to 290 tons ammonia.)
Mississippi River Fuel Corp.,
Crystal City, Mo. (planned for completion in early 1956; 200 tons per day)
Ammonia, ammonium nitrate, ammonia solutions.
National Distillers Products Corp. (U. S. Industrial Chemicals Co.),
Tuscola, Ill. (completion January 1955; 140 tons per day)
Ammonia; ammonium nitrate, nitrogen solutions. (Will employ byproduct hydrogen from ethylene unit.)
Phillips Chemical Co.,
Pasadena, Tex. (410 tons per day)
Ammonia; ammonium sulfate.
Etter, Tex. (440 tons per day)
Ammonia; ammonium nitrate, nitrogen solutions. (Plant at Etter, Tex., is government facility leased and operated by Phillips.)
Salt Lake Chemical Co.,
Salt Lake City, Utah (completion third quarter 1955)
Ammonia, 120 tons per day. Will also make 30 tons per day dry ice.
San Jacinto Chemical Corp. (Smith-Douglas Co., Inc.),
Houston, Tex. (120 tons per day)
Ammonia.
Standard Oil Co. (Ohio),
Toledo-Lima area (300 tons per day; plant to be constructed)
Ammonia; urea (125 tons per day), nitrogen solutions. (Possible use of byproduct hydrogen from cat reformer supplemented with hydrogen from natural gas.)
Shell Chemical Corp.,
Ventura, Calif. (150 tons per day)
Ammonia.
Pittsburg, Calif. (300 tons per day)
Ammonia; ammonium sulfate. (Ammonia operation to be expanded to use hydrogen-rich gas from Shell Oil Co., Martinez, Calif., cat reformer.)
Spencer Chemical Co.,
Pittsburg, Kans. (540 tons per day)
Ammonia; ammonium nitrate, nitrogen solutions, methanol, liquid and solid CO_2.
Henderson, Ky. (200 tons per day)
Ammonia; nitrogen solutions facility under construction.
Vicksburg, Miss. (200 tons per day)
Ammonia; nitrogen solutions.
Tennessee Valley Authority,
Wilson Dam, Sheffield, Ala. (250 tons per day)
Ammonia. (Note this is a noncommercial plant owned and operated by the Government).
United Chemical Co.,
Timpson, Tex. (planned for completion in late 1955; 160-180 tons per day)
Ammonia; urea (100 tons per day).

Other ammonia plants (hydrogen from chlorine cells)—Columbia-Southern Chemical Co. at Natrium, W. Va., 100 tons per day, completion first quarter 1955; Dow Chemical Co. at Pittsburg, Calif., 21 tons per day; Dow Chemical Co. at Freeport, Tex., 100 tons per day (present expansion due for completion in early 1955); E. I. du Pont de Nemours & Co., Inc., at Niagara Falls, N. Y., 30 tons per day; Hooker Chemical Co. at Tacoma, Wash., 60 tons per day; Mathieson Chemical Corp. at Lake Charles, La., 60 tons per day; Mathieson Chemical Corp. at Niagara Falls, N. Y., 20 tons per day; Midland Chemical Co. at Midland, Mich., 45 tons per day; Pennsylvania Salt Co. at Wyandotte, Mich., 100 tons per day.

Other ammonia plants (hydrogen from coke-water gas)—E. I. du Pont de Nemours & Co., Inc., at Belle, W. Va., 640 tons per day; Mathieson Chemical Corp. at Morgantown, W. Va., 570 tons per day.

Under consideration (hydrogen from natural gas)—Chilicothe Chemical Co., Chilicothe, Tex., 180 tons per day; Utah Chemical Co., Mount Pleasant, Utah, (ODM certificate—$18,725,000 at 45 per cent); Monsanto Chemical Co. (ODM certificate—$16,800,000; early construction not anticipated—part of long-range plan); Ammonia Chemical Corp. of California, Oleander, Calif., (ODM certificate—$4,000,000 at 45 per cent).

Under consideration (raw materials from coal processing)—Alabama By-Products Corp., Tarrant, Ala., (ODM certificate—$6,750,000 at 45 per cent).

TABLE 6—CANADIAN PETROCHEMICAL PLANTS

Company, location, and material—	Principal products
British American Oil Co., Ltd., Montreal, Que.	
Propylene and benzene	Cumene (to B. A. Shawinigan)
B. A. Shawinigan, Ltd., Montreal, Que.	
Cumene	Phenol and acetone (byproducts—acetophenone, mesityl oxide, and α-methyl styrene).
Bakelite (Canada), Ltd., (Carbide & Carbon Co. affiliate), Belleville, Ont.	
Methanol	Formaldehyde (for phenol-formaldehyde and urea-formaldehyde plastics).
Cabot Carbon of Canada, Ltd., Sarnia, Ont.,	
Petroleum fractions	Oil-type furnace black.
Canadian Chemical Co., Ltd., (Subsidiary of Celanese Chemical Corp.), Edmonton, Alta.	
Butane and propane (refinery streams)	Pentaerythritol, methanol, propylene glycol, dipropylene glycol, n-propanol, n-propyl acetate, acetic acid, acetone, other alcohols, glycols, aldehydes, oxides, ketones and cellulose acetates.
Canadian Industries, Ltd., Edmonton, Alta.	
Ethylene (by cracking natural gas)	Polyethylene (expansion to be completed at end 1954).
Maitland, Ont.	
Cyclohexane (imported base stock)	Adipic acid and hexamethylenediamine (nylon salts intermediates).
Calgary, Alta.	
Natural gas	Ammonia.
Canadian Oil Refineries, Ltd., Sarnia, Ont.	
Refinery streams	Hydrogen, methane, ethane, ethylene, propane, propylene, butanes, and butylenes.
Consolidated Mining & Smelting Co., Turner Siding, Calgary, Alta.	
Natural gas	Ammonia (250 tons per day) and ammonia nitrate; plan to increase ammonia capacity to 390 tons daily; urea unit also planned.
Dominion Tar & Chemical Co., Montreal, Que.	
Refinery gases (ethane and ethylene)	Ethylene oxide, ethylene glycol, higher glycols, and detergents.
Dow Chemical Co. of Canada, Ltd., Sarnia, Ont.	
Refinery gases	Ethylene oxide, ethylene glycol, ethyl dichloride, carbon tetrachloride, perchlorethylene, trichlorethylene, styrene and polystyrene, diethylene glycol, triethylene glycol, dichlorethyl ether, styrene-butadiene latex.
Sarnia, Ont. (expansion completed late 1954)	
Refinery byproduct hydrogen	Ammonia (present expansion to over 100 tons per day). Some hydrogen will come from cat reformer of Sun Oil Co., Ltd., Sarnia refinery.
Imperial Oil, Ltd., Sarnia, Ont.	
Refinery gases	Methane, ethane, ethylene, propane, propylene, and butylene.
Lubrizol of Canada, Ltd., Niagara Falls, Ont.	
Petroleum fractions	Lube-oil additives.
Monsanto Canada, Ltd., Montreal, Que.	
Styrene	Polystyrene.
Polymer Corp., Sarnia, Ont.	
Refinery streams	Styrene, copolymer and butyl rubbers, ethylene, isobutylene.
Royalite Oil Co., Turner Valley, Alta.	
H_2S from natural gas	Sulfur.
S. Nord Chemical Co., Petrolia, Ont.	
Cat reformate	Benzene, toluene, xylene.
St. Maurice Chemicals, Varennes, Que. (Shawinigan and Heyden)	
Methanol and acetaldehyde	Formaldehyde and pentaerythritol.
Shell Oil Co. of Canada, Ltd., Jumping Pond, Alta. (Plant being expanded, completion Dec. 1954)	
Sour natural gas	Sulfur.
Montreal, Que.	
Propane-propylene	Isopropyl alcohol and acetone.
Sherritt-Gordon Mines, Fort Saskatchewan, Alta.	
Natural gas	Ammonia (present capacity 75 tons per day; plan to double capacity); ammonium sulfate.
Sun Oil Co., Sarnia, Ont.	
Refinery streams	Butylenes.
Vosco Industrial Chemical Products, Ltd., Montreal, Que.	
Petroleum fractions	Dodecyl benzene and higher alcohols converted to synthetic detergents.

Where Polyethylene Is Pushing to New Records

Company and location—	Capacity, lb./yr.	Cost	Comp. date
Allied Chemical & Dye Corp., Buffalo, N. Y.*	20,000,000	$10,000,000	Operating
Carbide & Carbon Chem. Co., Seadrift, Tex.	60,000,000	$43,000,000	Summer 1954
Texas City, Tex.	60,000,000	$17,000,000	Operating
So. Charleston, W. Va.	70,000,000		Operating
Torrance, Calif.	50,000,000	†$36,000,000	End 1954
Canadian Industries, Ltd., Edmonton, Alta.	‡16,000,000	$13,500,000	End 1954
Dow Chemical Co., Freeport, Tex.	25,000,000	$12,000,000	Late 1955
E. I. du Pont de Nemours & Co., Orange, Tex.	§100,000,000	In excess of $10,000,000	Operating
Koppers Co., Inc., Port Arthur, Tex.			Mid 1955
Monsanto Chemical Co., Texas City, Tex.	66,000,000		Beginning 1955
National Petrochemicals Corp., Tuscola, Ill.	25,000,000	$14,000,000	Spring 1955
Phillips Chemical Co., Adams Terminal, Houston	Semiworks‖		
Spencer Chemical Co., Orange, Tex.	45,000,000	$14,000,000	Spring 1955
Texas Eastman Co., Longview, Tex.	20,000,000	$7,000,000	Early 1955

*Low-molecular-weight polyethylene wax (ethylene is made from residual oil). †Includes cost of ethylene oxide-glycol facilities. ‡Expansion; initial capacity 12,000,000 lb. per year. §Capacity recently doubled. ‖Low-pressure process.

ETHYLENE – 3

Polyethylene Push

...its expansion exceeds that of any other polyethylene derivative

THERE are now 11 companies manufacturing polyethylene, or preparing to, in United States and Canada. Fourteen plants are operating, under construction, or being engineered. This includes one commercial plant in operation in Canada and one semicommercial plant under construction in the United States.

From an important but necessarily limited wartime use, polyethylene plastic has been developed for a wide variety of end products. These include tough but pliable film for food packaging, "squeeze" bottles, and plastic pipe as well as the original use in electrical insulation. The increasing and well-advertised demand for polyethylene has invested this material with considerable glamour and has apparently made the current polyethylene expansion program the single largest current development in the petrochemical industry.

Billion-pound plastic? . . . When will polyethylene plastic hit the billion-pound per year mark? Will it make the billion-pound production before polyvinyl and polystyrene plastics? Some predictions have been made involving the magic billion-pound figure, but with many polyethylene markets still in the development stage such predictions may be somewhat academic.

The roundup given in the accompanying table does, however, indicate what to expect by 1955-56. If this tabulation is taken at its face value, one would expect that by the end of 1955, polyethylene capacity on the North American Continent will be between 500,000,000 and 600,000,000 lb. per year; in fact, that it would be closer to the higher of these two figures. Projection of total investment from this tabulation shows it to be well over $25,000,000.

At first glance this tabulation would indicate a somewhat faster expansion than was projected some 15 months ago.[1]

Actually, it has been noted[2] that despite announced completion dates, new production in 1955 probably will be only between 50,000,000 and 75,000,000 lb. per year, and perhaps closer to the lower figure. Initial production rates will likely be considerably under capacity and some time must elapse as new companies get the "feel" of the operation and accumulate the know-how to make high-purity polyethylene.

By 1956 . . . It may be expected that all the capacity indicated in the accompanying table will not come on till sometime in 1956 so that the net effect will be to bring the expansion into line with the projection of over a year ago, though that was based on the participation of only six companies building nine new plants.

What will it cost? . . . Polyethylene was under government allocation not so long ago and sold officially for $1 per pound, although there was a sizable gray market in the then-scarce material. It has since come down in stages to 44 cents per pound. Predictions have been made that the price may go down eventually to the neighborhood of 30 cents per pound. This might further stimulate the demand for polyethylene. It might, for example, make polyethylene plastic pipe more competitive with steel pipe for certain applications. Reduction in price might also put a manufacturing squeeze on the nonintegrated producer.[2]

How the push started . . . Until the present expansion began, Carbide & Carbon Chemicals Co. and E. I. du Pont de Nemours & Co., Inc., shared total United States production of 125,000,000 lb. per year. Carbide began production at its South Charleston plant in 1943 and expanded capacity at that location to 70,000,000 lb. annually. Du Pont began production at Belle, W. Va. Later, du Pont built ethylene-polyethylene facilities at Orange, Tex. It is believed that du Pont at Orange recently doubled its capacity. Meanwhile, Carbide began con-

SPENCER'S POLYETHYLENE PLANT

...Engineering plan

...and current construction

Ground was broken on July 9 for Spencer Chemical Co.'s $14,000,000 polyethylene plant, located on a 400-acre tract of land south of Orange, Tex., near the Sabine River, in an area known as "Petrochemical Row." The new plant, with a design capacity of 45 million pounds of polyethylene per year, is part of the big polyethylene expansion program.

struction of three new plants with total capacity approaching 200,000,000 lb. per year. This set off the big polyethylene push.

Making Polyethylene

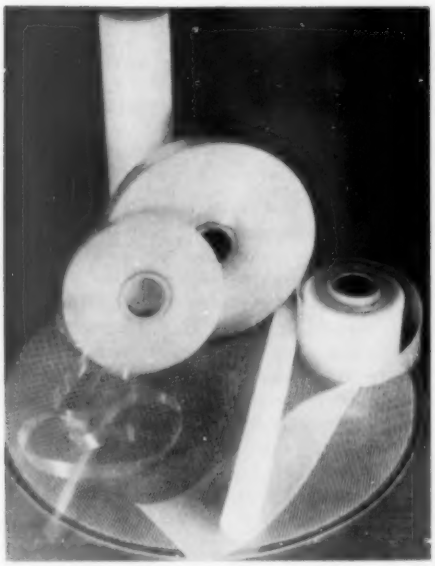
Polyethylene was discovered in 1933 by a research team of Imperial Chemical Industries, Ltd., in Britain. The name is a generic term for a range of solid polymers consisting of many ethylene units linked together. Polyethylene liquids, greases, soft waxes and some brittle waxes may be said to consist roughly of molecules containing, on the average, less than 300 carbon units. Tough waxes are generally in the neighborhood of 500 carbon units. Commercial polyethylene (high polymer) has molecules with approximately 1,000 to 2,000 carbon units and crystallinity percentage approximately between 60 and 75 per cent.

Mum is the word . . . Security agreements between I.C.I. and licensees have limited stringently public information on the construction of reactors and compressors and process details. Virtually sole published information is that in the patents.

Originally I.C.I. made its ethylene by fermentation. Imperial now makes its ethylene in England by cracking of liquid petroleum fractions.[3] In the United States, Allied Chemical & Dye Corp.'s Semet-Solvay division uses residual oil to make ethylene at its plant in the Buffalo area and ends up with a high-melting-point polyethylene wax (low polymer). It is rumored that without too many changes in equipment Allied could go to the high polymer. Other plants make ethylene from cracking of ethane or propane.

Recycle? . . . In I.C.I.'s high-pressure process, and modifications thereof, pressure may range between 15,000 and 35,000 psi. It is believed that Carbide (which licenses from I.C.I. but has developed its own modifications) employs a pressure of 30,000 psi. to obtain a conversion of about 25 per cent. It is said that Carbide does not recycle unreacted ethylene, this being converted to other ethylene derivatives, and does not employ liquid diluents. However, du Pont is stated to operate with water and benzene as diluents at about 22,000 psi. with recycling of unreacted ethylene.

Low-pressure process . . . Much interest and speculation has been generated by announcement of Phillips Chemical Co. that it is developing a low-pressure process to operate at less than 500 psi. Questions have been raised as to the possible purity of polyethylene so pro-



Polyethylene rod, tape, and film. Ethylene is made from liquid petroleum fractions at Imperial Chemical Co., Ltd.'s, olefin plant No. 1, Wilton Works, shown at right.

duced. It is thought by some that this material may find its greatest usefulness in blends. Meanwhile, Phillips is going ahead with its semiworks plant on the Houston ship channel. Production from this plant will go to plastic manufacturers for tests.

High-pressure process . . . Ethylene, highly purified, is precisely mixed with oxygen in a very small concentration. The mixture is compressed in two main stages to 18,000 psi. and enters the reaction vessel at 400° F. During polymerization a considerable amount of heat is developed and its removal has been a big problem in the design of polyethylene plants.

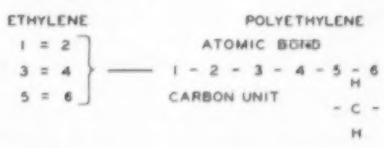
The two processing requirements—high pressure of up to 35,000 psi. and moderate temperature of 300° to 500° F.—posed conflicting engineering demands. The walls of pipes and vessels must be massively thick to contain pressures equivalent to those formed in the barrel of a firing gun. But these thick walls make it exceedingly difficult to keep reaction temperature down. The heat generated by the formation of a pound of polyethylene is close to 2,000 B.t.u. and must be quickly removed to prevent the development of an uncontrolled and explosive reaction.

Steel reactors are a specialty of English Steel Corp., Sheffield, England, which is very busy on United States purchase orders. In addition, it is also supplying similar reactors to I.C.I.-licensed polyethylene plants in Italy and France. Another plant in Germany is being constructed without I.C.I. aid, but is licensed under the British company's patents.

Polyethylene Properties

The liquid polyethylene emerges from the reaction vessel as a transparent stream. It is then cast into blocks. Commercial polyethylene is a tough, waxy-looking material, normally white, though occasionally slightly gray or pink, made in the form of sheets, rods and granules, or flakes. It has a remarkable combination of insulating properties, namely, great dielectric strength, extraordinary toughness and flexibility, lightness, and extreme water resistance. Chemically, it is very inert and is generally only attacked by acids or alkalies at high temperatures. The product is thermoplastic and can be extruded or molded by compression or injection. No special tools are required for machining or welding. Its tensile strength falls with increasing temperature and it melts sharply at about 239° F., the yield point being reached at around 194° F.

How ethylene polymerizes . . . The theory of ethylene polymerization is briefly, though not perfectly, stated in this manner: The double bond containing the carbon atoms of ethylene separate to form the daisy-chain linkage of polyethylene:



But the properties of the commercial product do not fall in line with this straight-chain concept. Instead, the twisting, turning growth of the polyethylene molecule apparently results in a festoon of short and long side chains, that give the plastic its semicrystalline flexibility. They interfere with the formation of hard, brittle crystallites into which its molecules tend to gather. By meticulous control of temperature, pressure, and duration of reaction the operator must grow polyethylene molecules that both have a proper size and simultaneously an optimum number of side branches.

Polyethylene rubber . . . Polyethylene is not very reactive chemically, but by introducing bulky chlorine atoms irregularly along the chain, one gets a strong, attractive rubber which may be set or vulcanized by use of a small proportion of SO_2Cl groups introduced at random along the chlorinated polyethylene chains. The balance of the substituents is vital—if too many or too few chlorine atoms are introduced, a resin will result; too many chlorosulphonyl groups yield a polymer difficult to process while too few render vulcanization impossible.

Irradiated polyethylene . . . An interesting new technique for modifying polymer structure and obtaining a thermosetting material consists in exposing the plastic to high-energy radiations (neutrons or gamma rays) which break some of the bonds. This process produces radicals which combine to give a crosslinked polymer, the degree of crosslinking being determined by the amount of irradiation. When polyethylene is irradiated a few crosslinks are formed which have the effect of making it insoluble and infusible, but with-

out breaking up a large proportion of the ordered crystalline regions. If the crystallites are melted by raising the temperature (e.g. to 250° F.) the cross-linked polyethylene becomes rubbery and retains its shape. In fact, this is similar to a vulcanized rubber. Heavy irradiation gives a new product—many crosslinks are formed, crystallinity is destroyed, and the polyethylene is converted into a hard polymer which is glasslike and infusible.

Recent papers have reported on experimental polymerization of ethylene by gamma radiation.[5,6]

Insulation . . . Polyethylene's outstanding conjunction of electrical properties renders it very valuable for all types of electrical equipment, e.g., for solid insulated and air-spaced high-frequency cables, where the power loss must be as small as possible, and for submarine and power cables. Other electrical outlets include molded parts, such as cable ends, high-voltage brushes, and condenser dielectrics.

The suitability of this material for electrical purposes should not, however, be allowed to obscure its other applications. Compounded with waxes, the soft grade raises melting point of the waxes and reduces their tendency to crack or flare. Its good water resistance makes it an admirable wrapping material, especially for hot or humid climates. It may also be used for molded containers and general fancy goods. Its translucent white appearance is attractive, and it is easy to color by the addition of pigments.

Other uses . . . Polyethylene has recently been developed as a coating for papers and fabrics. Materials so treated are glossy, tasteless, odorless, and almost water white. Tests indicate that they are likely to be of value for many applications and in particular for the packaging of foodstuffs and chemicals. This versatile plastic is also finding a wide range of industrial uses, where its chemical inertness and toughness are of key importance. It is, for example, being employed for press tools for metal processing, chemical plant components, and moldings. Other applications range from tubing in cold-water plumbing and beer-pumping installations in bars and breweries, to suspenders, and liners for bottle closures.

Early experimental investigations on high pressures were carried out by the French savant Amagat well over half a century ago. Brunner, Mond & Co. (parents of I.C.I.'s Alkali Division) became interested in this subject after World War I through contact with Prof. A. M. J. F. Michels, of Amsterdam

"Polyethylene has a remarkable combination of insulating properties, namely, great dielectric strength, extraordinary toughness and flexibility, lightness, and extreme water resistance."

University. Several of Brunner-Mond's staff worked with Professor Michels who was doing an exceptional job at high pressures, and he frequently visited their laboratories at Winnington, Cheshire. From this collaboration stemmed I.C.I.'s decision to embark on research relating to the effect of extremely high pressures (from 15,000 to 300,000 psi.) on certain chemical reactions.

Work on this problem was started in 1931. In 1933 extremely high pressures were employed in an attempt to force a copolymerization between liquid ethylene and an aldehyde compound. Early that year a trace of white solid was found in the reaction vessel, and it was polyethylene—a solid polymer of ethylene.

Attempts to repeat initial experiments resulted in violent explosions in the reaction vessels. However, through careful attention to the reaction conditions and the purity of the ethylene gas, the process was brought under control. By 1936 important advances were registered, and the beginning was made toward devising a continuous process of manufacture.

Work at pressures above 15,000 psi. made it imperative to design novel gas compressors, joints, valves, tubing, reaction vessels, and kindred equipment. As the pressures were akin to those occurring in a gun on the explosion of the charge, the method employed in the manufacture of artillery was emulated in construction of reactors. Pilot plants were operated in 1937 and 1938.

During this period of technical development, a study was made of the properties of this wholly novel product. Its outstanding electrical characteristics—unusual toughness, flexibility, lightness, and water resistance—augured a promising future in electrical and electronic engineering.

In 1938 contact was made with Telegraph Construction & Maintenance Co., with unrivaled experience in the processing of gutta percha, particularly for submarine cables. This firm was quick to appreciate the potentialities of polyethylene and adapted some of its machinery to the new material. An experimental length of undersea cable was made toward the end of 1938, and a mile length the following year. Even at this pioneer stage marked interest was evinced by the British Post Office in this new material. Further experience indicated that polyethylene was not only promising for telephone and telegraph cables, but also for high-frequency work, especially in television. Results proved so satisfactory that I.C.I. decided to design and construct a full-scale manufacturing unit, which started production on September 1, 1939—the very day Germany invaded Poland; but polyethylene had already given such convincing evidence of its potentialities that the decision to double the capacity of the plant was taken even before it was commissioned.

The first ton of polyethylene from the commercial unit which began production in 1939 was employed in radar experimental work. The outbreak of World War II wedded these two inventions.

Meanwhile, in 1940, I.C.I. had shipped polyethylene to the United States. It was processed by du Pont and a cable, fabricated by Western Electric Co., was laid on a section of Bell Telephone Co.'s trunk telephone lines. America, too, experienced difficulties over the insulating of radar cables, and in 1941 it was decided to standardize on polyethylene. Accordingly, an American delegation visited I.C.I. and was given full information about manufacture. Polyethylene production started in the United States in 1943.

Polyethylene's wartime contribution to radar overshadowed all else, but it had other important applications—sleeving in radio equipment, in the fuses of rocket shells, and, as strip or transparent film for packing the antimalarial mepacrine. With the end of World War II this commodity once more became important in the field of telecommunication.

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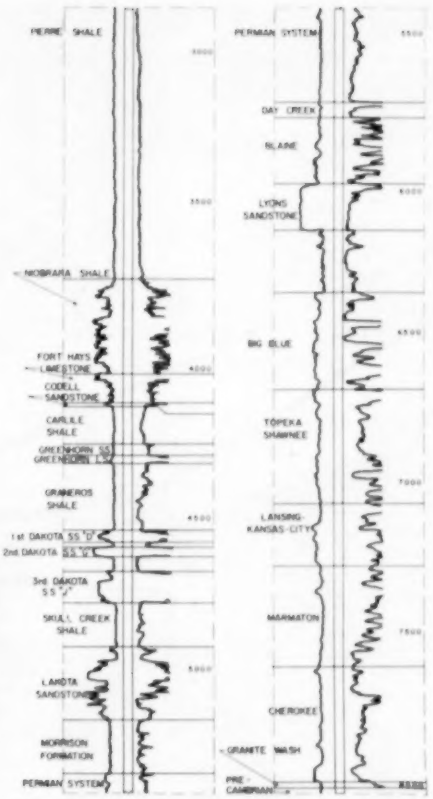
DRILLING WELL of Petroleum, Inc., in Medina field, Logan County, Colorado. The well is being drilled by Garvey Drilling Co., contractor.



TYPE COLUMNAR SECTION of Paleozoic and Mesozoic rocks found in the deeper portions of the Denver-Julesburg basin. (Courtesy Ohio Oil Co.)

ACTIVE DRILLING AREA

New Pipelines Assure Denver-Julesburg Expansion

by C. O. Willson
Consulting Editor

CONFIRMATION of plans to build two big-inch crude-oil pipelines east from Colorado and Wyoming with connections to the basin, has brought renewed speculation as to the future of the Denver-Julesburg basin, one of the most active drilling areas of the entire country at this time.

The additional transportation facilities are interpreted as reflecting confidence on the part of important oil interests that further large-scale development is assured from existing and new formations, to the end that the basin will be a major source of crude supply for many years to come. Predictions are heard that the basin will become one of the few half-billion-barrel or more proved reserves in this country, or more than double its present rating.

The assured additional pipeline outlets will also tend to correct an unsatisfactory market situation in which considerable quantities have sold at prices under comparable crude oils in other areas. Some of this oil has been and is moving by truck to pipeline gathering stations with the producer in effect absorbing the extra cost of this type of transportation. These distress sales have brought low net returns to a few producers in new fields where, under normal pricing conditions, quick payouts would prevail.

One of the new pipelines is being built by Arapahoe Pipeline Co. (Sinclair Oil & Gas Co. and Pure Oil Co.), and will consist of 18 and 20-in. pipe. *(See The Oil and Gas Journal, August 16, page 91).* The line will have an initial capacity of 80,000 bbl. daily, 30,000 bbl. of which will come from fields in western Kansas.

It is pointed out here that the size of the line indicates that the owners are thinking in terms of ultimate deliveries of 150,000 to 200,000 bbl. daily, most of which presumably would come from the Denver-Julesburg basin. The principal pipeline outlet of the fields now is the Platte Pipeline Co. line from Wyoming to the East St. Louis, Ill., area with a connection to the Denver-Julesburg fields.

The second new line will be that of Western Pipe Line Co., a subsidiary of Service Pipe Line Co., which will extend from Fort Laramie, Wyo., to Freeman (near Kansas City), Mo. *(See The Oil and Gas Journal, August 23, page 107).* This will have a connection to the Denver-Julesburg fields. The Western line, with 20, 22, and 24-in. pipe, is designed to transport

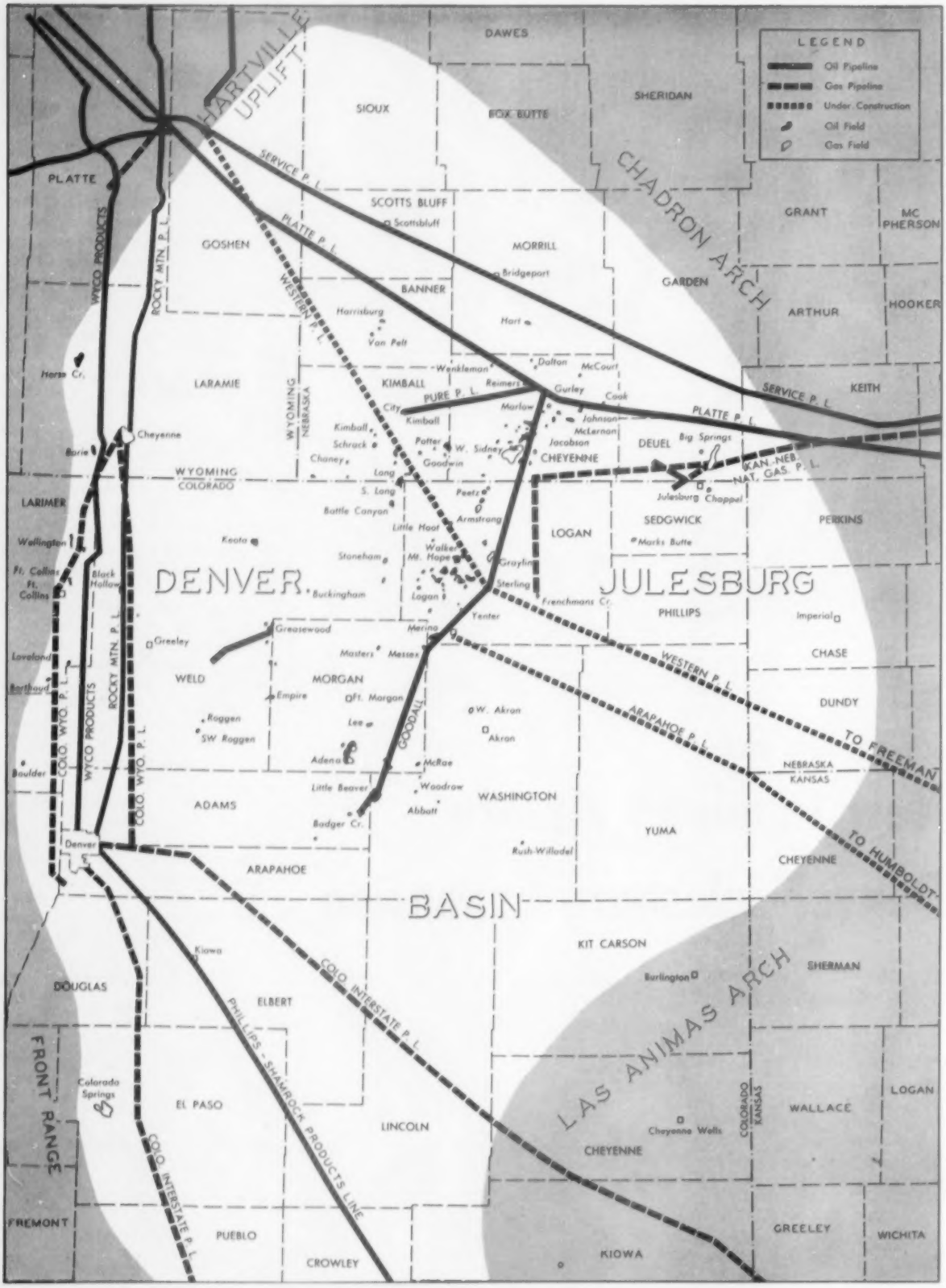
TABLE 1—DRILLING IN DENVER-JULESBURG BASIN—1949 TO AUGUST 1, 1954

State—	Development wells				Wildcat wells			
	Total	Oil	Gas	Dry	Total	Oil	Gas	Dry
Colorado	1,072	746	36	290	960	86	25	849
Nebraska	507	324	37	146	526	64	20	442
Kansas	4	1		3	4	1		3
Wyoming	16	1		15	16	1		15
Total	1,599	1,072	73	454	1,506	152	45	1,309

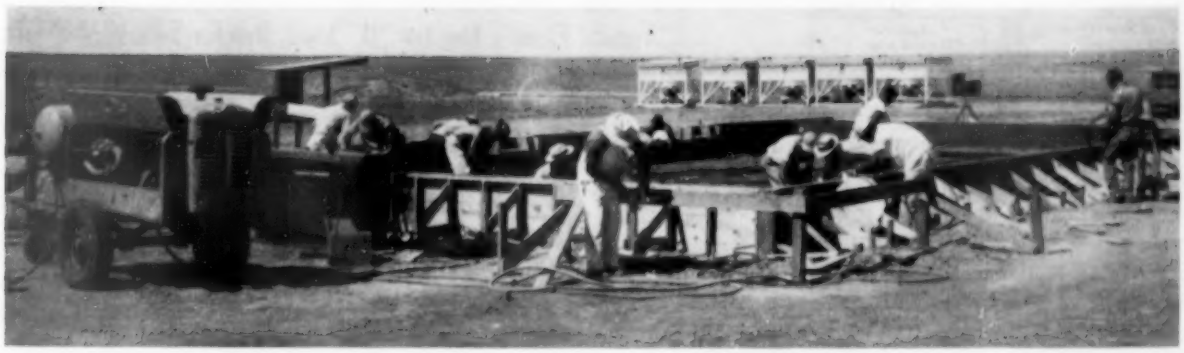
TABLE 2—DEVELOPMENT AND WILDCAT DRILLING IN DENVER-JULESBURG BASIN

	1954*		1953		1952		1951		1950		1949		Total	
	D	W	D	W	D	W	D	W	D	W	D	W	D	W
Colorado	412	286	320	298	210	199	122	111	24	42	3	18	1,091	954
Nebraska	129	78	154	154	116	144	63	99	36	48	4	9	502	532
Wyoming			2	3	4	4		2		2		5	6	16
Kansas						4								
Total	541	364	476	455	330	351	185	212	60	92	7	32	1,599	1,506

*7 Months. D—Development. W—Wildcat.



ONE OF THE INDUSTRY'S MAJOR RESERVES . . . Outline of the Denver-Julesburg basin showing representative fields and existing and planned crude-oil pipeline outlets.



START OF GASOLINE PLANT being constructed by Continental Oil Co., et al, in the Little Beaver area of the Denver-Julesburg basin.

large quantities from the basin as the oil becomes available.

These developments give encouragement to the hundreds of large and small operators in the basin who have either production or lease holdings and who have exploratory and development programs scheduled for the remainder of this year and in 1955.

The projections in exploratory drilling call for programs comparable to the widespread activity of the past 2 years with the expectation that satisfactory results of the past will be duplicated. In addition, based on geophysical and other exploratory investigations, operators express confidence that the present producing area will be widened over the established trend and deeper formations will be established as productive.

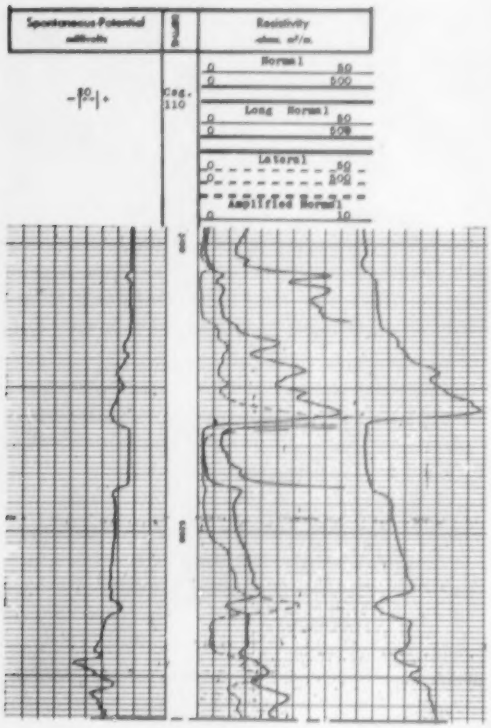
TYPICAL PUMPING UNIT in the Denver-Julesburg basin.

HEATER-TREATERS and separators, installation in Little Beaver field.

TABLE 3—LARGER FIELDS OF THE DENVER-JULESBURG BASIN*

Field and county—	Year of discovery	Approx. prod. (bbl. oil/day)	No. of prod. wells	Prod. form. (U. Cretaceous)	Depth range	Disposition	Gravity	Drilling wells
COLORADO:								
Adena—Morgan	1953	12,821	123	D & J	5,595	Pl. & Trk.	40°	10
Badger Creek—Adams	1953	2,422	45	D	5,250	Pl. & Trk.	40°	0
Battle Canyon—Weld	1953	594	10	J	6,115	Pipeline	36°	0
Black Hollow—Weld	1953	1,200	6	Lyons (Permian)	8,965	Truck	36°	1
Dale—Logan	1953	366	10	D	4,650	Pipeline	39°	0
Lewis Creek—Logan	1953	1,893	16	J	5,360	Pipeline	39°	1
Little Beaver—Adams and Washington	1951	7,000	86	D & J	5,250	Pipeline	40°	1
Luft—Logan	1952	1,050	33	D & J	4,950	Pipeline	41°	0
Merino—Logan	1950	912	20	J		Pipeline	39°	0
Mount Hope—Logan	1950	1,791	62	J	4,875	Pipeline	41°	1
Pawnee Creek—Logan	1951	232	12	J	4,915	Pipeline		0
Walker—Logan	1950	550	20	J	4,970	Pipeline		2
Wellington—Larimer	1923	138	11	J	4,210	Pipeline	38°	0
Yenter—Logan	1950	3,059	66	J	5,090	Pipeline	38°	0
WESTERN NEBRASKA:								
Doran Farms—Cheyenne	1953	1,100	31	D	4,595	Truck	35°	0
Dorman	1950	850	16	D	4,686	Pipeline	37°	0
Enders—Kimball	1951	2,425	30	J	6,340	Pipeline	37°	3
Gurley	1949	450	19	D	4,403	Pipeline		0
Harrisburg—Banner	1951	1,000	10	J	5,880	Truck		6
Hart—Morrill	1952	160	4	J	4,002	Truck		0
Huntsman—Cheyenne	1950	1,250	38	J	4,810	Pipeline		0
Kugler—Cheyenne	1952	570	7	J	4,530	Pipeline		0
Long—Kimball	1952	1,500	22	D & J	6,105	Pipeline		6
Preble—Cheyenne	1952	950	11	D	4,446	Pipeline		0
Southwest Potter—Kimball	1951	2,400	54	D	5,538	Pipeline		0
Total		46,683	762					31

*In addition 101 smaller fields in the basin are producing about 30,500 bbl. of oil per day from approximately 475 wells. Colorado production is state estimate. (Data supplied by Petroleum Information).



Typical Electric Log for "D" Sand, Denver-Julesburg Basin

(Continental Oil Co. 1 Selby, NE NE SW 9-1s-56w, discovery well in Bobcat field, Washington County, Colorado)

DRILLING DATA: Spud January 14, 1954; 10¾-in. casing at 111 ft.; 7-in. casing at 5,216 ft.; elevation 4,520 ft. rotary bushing. Log tops: Niobrara 4,290 ft., Timpas 4,660, Greenhorn 4,793, "D" sand 5,105, "J" sand 5,183. Drill-stem test 5,132-59 ft., 88 minutes, shut in 15 minutes, gas in 4 minutes, oil in 35 minutes, flowed at rate of 43 bbl. oil per hour, flowing pressure 1,240 psi., shut-in pressure 1,360 psi., bottom-hole pressure 2,640 psi. Drill-stem test 5,184-5,202 ft. (J), 20 minutes, shut-in 20 minutes recovered 200 ft. of slightly oil and gas-cut muddy water, 3,080 ft. of water, flowing pressure 1,390 psi. Perforated 5,131-66 ft. Rig off February 1, 1954.

CORE ANALYSIS on 16 ft. of this "D" sand section indicated average porosity of 18 per cent, and average horizontal permeability of 235 md. (net productive "D" sand interval 21 ft.). This well was completed for initial production of 645 bbl. oil per day, flowing through a 1-in. choke, tubing pressure 5 psi., gas volume 290 M.c.f. per day, gas-oil ratio 450 cu. ft. per bbl.

Throughout the fields of the basin there is a rather high variation between the low and highs of porosities, permeabilities, and net productive sand thicknesses. However, it is estimated that an average in the basin would be the following:

Porosity: 19 per cent.

Permeability: 150 md. (core analysis has actually indicated some sections to be 4,000 md.).

Net productive sands should average approximately 15 ft.

Area

The Denver-Julesburg basin usually referred to as the Denver basin in the geological literature—is an egg-shaped area of about 48,000 sq. miles, equivalent to the land areas of either New York State or Louisiana. It is located in eastern Colorado, southeastern Wyoming, western Nebraska, and northwestern Kansas.

It is described in the literature as bounded on the west by the Front Range and Wet Mountain uplift. In Wyoming it is bounded by the Hartville uplift and Laramie range. On the east in Nebraska is the Chadron arch with Las Animas arch limiting the basin in Colorado and northwestern Kansas. The southern limit is the Apishapa arch in southeastern Colorado.

The basin is about 390 miles at the greatest north and south distance and 250 miles in maximum width. The basin is asymmetrical with a deep dip along the mountain range with gentle dipping along the east flank. The maximum downwarp is found at Denver and is known as the "Denver low," and another is found at Cheyenne and is known as the "Cheyenne low."

History

Oil production in the basin is almost as old as the oil industry in this country. Commercial production from the Pierre shale was discovered in 1862 in what became known as Florence field along the southwest boundary of the basin. This field for years supported the only refinery in the state and the field still has a small output. In 1901 small production from the same type formations was found near Boulder on the west side.

Sustained production in small fields was discovered in 1923 at Wellington and Fort Collins. These discoveries brought considerable wildcatting along the west side of the basin without commercial success. In 1930, Morgan and Weld counties first came into prominence when Greasewood field was discovered. This proved the presence of production on the east flank of the basin and led to considerable wildcatting in the area.

Starting in 1940, reports show there was an increasing interest in seismograph surveys. Large holdings were acquired to carry on this work. While a number of structural dry holes were drilled based on seismograph information, operators were encouraged to continue by the showings obtained in scattered tests along the northeastern part of the basin.

Ohio Discovery

Ohio Oil Co. was a pioneer in this seismograph work over a period of several years. Its discovery of what became known as Gurley field in May 1949, is credited to this program. It proved to be the discovery well of today's Denver-Julesburg modern development, bringing about the most intensive exploratory drilling in the history of the Rocky Mountain area.

Other discoveries followed rapidly. In 1950 there were additional discoveries in Nebraska and fields have been found across the line in Colorado.

What has happened over the past 5 years, particularly the last 2 years, was largely unpredictable but now that a major operation has been definitely established, it is possible to look forward as well as backward with some degree of certainty. Tables 1, 2, and 3 were prepared for the purpose of giving a summary of what has taken place and as a statistical review of what the basin is today, productionwise.

Many Wildcats

Up to August 1 this year, reflecting the widespread exploratory activity, the number of wildcat tests, 1,506, about equals the 1,599 development wells that have been drilled. From these 1,506 tests, 152 oil discoveries were reported and 45 gas discoveries, a relationship between tests and discoveries well above the national average. Some of the oil discoveries have not proved productive but as of the first of August, 126 fields were reported as producing crude oil commercially. Present production of the basin fields is approximately 80,000 bbl. daily.

In the development phase the number of dry holes has been high, averaging better than 25 per cent. Some

operators recently have been able to reduce the number of these development failures as they have become acquainted with subsurface conditions.

Southeastern Wyoming and northwest Kansas, within the basin, are each credited with a discovery oil well. Subsequent development has not been encouraging in those areas and present production comes largely from Nebraska and Colorado fields.

Wildcatting has spread rapidly over the past 5 years, including remote areas which have had nothing but dry holes to report up to this time. Before the close of 1949, 32 wildcats had been drilled, followed by 90 in 1950, 212 in 1951, 351 in 1952, 455 in 1953, and 476 during the first 7 months of this year. The gains exceed those of any other major United States area for the period.

The first discoveries were along the northeast rim of the flank and modest-sized discoveries resulted. The big expansion started when discoveries began in the more central part of the basin, centering in Morgan County from which a large part of the total production now comes.

Adena

Adena field, of Morgan County, to date is the "sensational" discovery of Denver-Julesburg. The official discovery well is credited to last year and the field now has 123 wells with daily production of approximately 13,000 bbl. It is given at this time a 70,000,000-bbl. reserve, with the second largest production (Rangely first) in Colorado. The limits of the field have not been defined and 10 development wells are now drilling.

This field produces from both "D" and "J" sands of the Upper Cretaceous with both flowing and pumping wells. Forty-acre spacing is generally ordered in this and other fields. Due to the large reserve involved, operators are making plans for a long-range development under a unitization program. A natural-gasoline plant will be built and a pressure-maintenance program with water is being discussed. A market for the residue gas will be available through a gas utility serving the area.

In the same general area the second largest field in the basin is Little Beaver of Adams and Washington counties, a discovery of 1951 with a current production of 7,000 bbl. daily.

Gasoline Plant

As previously announced, the first natural-gasoline plant of the basin is now under construction with operation to start about November 1. The $2,000,000 plant will be owned by several operators in Little Beaver, Badger Creek, and Bobcat fields with Continental Oil Co., the operator. The plant is located 30 miles south of Brush, Colo., and about 75 miles east of Denver.

The plant facilities will include compressors and low-temperature extraction processing to handle approximately 10,000,000 cu. ft. of gas daily. The gas will have a liquid content of 8 gal. per 1,000 cu. ft. This will include 1 gal. of 26-lb. natural gasoline, 2 gal. plus of butane and 4 gal. plus of propane. It is understood that consideration is being given to the sale of these products by truck in the Denver market. The residue gas will be sold to a natural-gas gathering system which will be prepared to serve that area.

Mostly Cretaceous

As reflected in the accompanying Table 3, all but a small part of the basin production of 60,000 bbl. daily comes from the "D" and "J" sands of the Upper Cretaceous. These sands vary in thickness and extent and are still the formations being sought in new exploration.

Starting last year considerable interest has been apparent in the deeper Permian formation resulting in the development so far of Black Hollow field in Weld County and a discovery of minor importance in Keota field. Since then a large number of wildcats have been drilled for the Permian sand found in Black Hollow field at a depth of 8,965 ft. Results to date have not been encouraging.

The exploration program includes tests for the deeper pays. Particular attention in some quarters is being given to the Pennsylvanian which has proved dry in several tests.

Drilling Practices

The main attraction of Denver-Julesburg so far has been the finding of the Upper Cretaceous production at relatively shallow depths. This fact plus the program of farmouts on the part of larger holders of leases explains the influx of independent operators over the past 3 years.

Drilling and completion practices in the easily penetrated formations emphasize speed. A representative 5,200-ft. well can be drilled in 9½ days. This is from the spud date to the date on which the rig is released. It includes waiting-on-cement time for both surface casing and the oil string. Cases are reported in which this average time has been reduced 2 days.

Drill-stem testing uses double packers about 8 ft. apart. In completing the test the production string is set through the pay zone. Perforation takes place above and below the producing zone. The wells are brought in by displacing the drilling fluid with oil or water, followed by swabbing. The contract drilling cost is around $3 per foot.

Quality of Crude

In general the crude oil now being produced from the Upper Cretaceous and Permian formations is comparable in quality to the mixed-base crudes in the high-gravity fields of the Mid-Continent. Accompanying tables give summaries of laboratory tests made of the Little Beaver (Upper Cretaceous) and Black Hollow (Permian) crudes.

Pricing practices vary. It is certain that this situation will be ironed out as soon as there are adequate pipeline connections to middle western and eastern markets with gathering systems extended to all fields.

Some sales are reported on what amounts to delivered prices to outlets in the St. Louis and Chicago areas. In these cases the refiner buyer pays the delivered price for Mid-Continent crude oil or slightly lower. Then the costs of transportation from delivery points to the Denver-Julesburg basin are calculated and these subtracted from the delivered prices in arriving at the producer quotations.

In some cases trucking costs amounting to 40 or more cents per barrel are involved in getting the oil to the gathering point of the pipeline system. These are paid by the producer. Some distress arrangements involving independent operators are reported in which the netback to the producer is substantially lower than the arrangements outlined above.

It should be pointed out that dry-hole costs are given a lower figure than that shown in Table 4 by some companies doing their own drilling. One large operator is reported to have drilled slim holes on structure information at a figure about two-thirds the wildcat cost given in the tabulation.

One large operator drills 300 ft. of 15-in. hole and cements a 200-ft. string of 10¾-in. casing at the surface. This drilling and casing time requires 12 hours while, waiting-on-cement time is 36 hours. The operator then drills a 9-in. hole to a few feet above the first sand of the Upper Cretaceous. Coring is carried on at this point with a 7⅝-in. core bit.

General Geology

The Denver-Julesburg basin is both a surface and a structural basin. It is spoon-shaped, asymmetrical, with a very gentle east flank and an extremely steep west flank where the rock sequences rise abruptly and almost vertically, to be over-ridden by the Front

Range uplift. Its surface axis centers at Julesburg in extreme northeastern Colorado, but its structural subsurface axis is aligned sharply north-south between Denver and Cheyenne. It is along this Denver-Cheyenne axis that the maximum structural downwarping and consequent maximum thicknesses of rocks are encountered. The total structural relief between the east flank and the center trough of the Denver-Cheyenne "low" is more than 20,000 ft. on the pre-Cambrian basement complex. The basin began to form in early Pennsylvanian time, but its maximum period of deposition of sediments was in Cretaceous time.

Stratigraphy . . . On the surface, the Denver-Julesburg basin is blanketed by east-dipping Tertiary sediments over the eastern half, and by west-dipping Upper Cretaceous deposits over the western half. The Tertiary surface beds in the east mask the continuation of the west-dipping Cretaceous sequence to the east flank of the basin.

The majority of the stratigraphic column in the basin consists of Cretaceous rocks; of these, Upper Cretaceous beds comprise the greatest thickness. The total Cretaceous section varies from zero in western Nebraska to about 17,000 ft. along the Denver-Cheyenne axis.

Below the Cretaceous lies a sequence of Jurassic (0 to 500 ft.), Triassic (0 to 1,000 ft.), Permian (500 to 2,500 ft.), and Pennsylvanian (0 to 4,000 ft.). Generally, the thickest sediments of each age lie along the structural axis of the basin, before the Front Range, and the thinnest occur on the basin's east flank. An exception is the Permian, which thickens south and east.

TABLE 4—DRY-HOLE COST

Contract and day work	$18,700
Location and roads	600
surface casing	360
Mud and chemicals	1,500
Core bits, catchers, etc.	2,000
Drill-stem tests	800
Haul material, etc.	500
Well surveys	1,000
Services, cementing, etc.	540
Miscellaneous	1,000
Total	$27,000
Producer	
Casing and tubing	$11,500
Well-head equipment and connections	800
Pumping unit, power equipment and controls	8,200
Flow line and miscellaneous connections	400
Haul material, etc.	600
Installation and labor	2,000
Treater, tanks, and miscellaneous	4,500
Total	$28,000
Estimated total cost of drilling and equipping a producing well	$55,000

Producing reservoirs . . . With two exceptions, all current production in the Denver-Julesburg basin comes from sands of both Upper and Lower Cretaceous age, with the majority originating in the "D" and "G" sands of Dakota (Upper Cretaceous) and the "J" sand of Lower Cretaceous age. The exceptions are both Permian (Lyons sand) producers; they are the Black Hollow and Keota fields, both in Weld County, Colorado. To date, the search for additional Permian production has been disappointing.

Local structure . . . Oil and gas accumulations in the basin are, as a rule, unrelated to large structural closure, but are more likely to occur on terraces, as stratigraphic traps, and on faults of low displacement. Most of the Dakota sands are lenticular, and as a result, most fields are small in areal extent and display a minimum of structural development. Where structure is present, it is usually of very low relief, the amount of closure lying almost within the limit of error of seismic surveys.

TABLE 5—DISTILLATION TEST OF CRUDE OF THE CALIFORNIA CO.'S BLACK HOLLOW FIELD (PERMIAN), WELD COUNTY, COLORADO

Gravity at 60° F., A.P.I.	36.0	Pour point, 40° F. and still flowing	
Viscosity at 32° F., S.s.U.	103.5	Sulfur, per cent	0.50
Viscosity at 70° F., S.s.U.	60-69	Ramsbottom carbon residue, per cent	1.27

At Denver elevation		275° F. gasoline low temp.		Crude low temperature
Distillation	°F., A.S.T.M. D-86-40	Based on fraction	Based on crude	Noncondensable
5	251			
10	302			
15	331			C_2 0.03
20	373	C_3 0.20	0.02	C_3 0.12
30	452	C_3 1.15	0.12	C_3 0.28
40	511	iC_4 0.95	0.10	iC_4 0.16
50	567	nC_4 2.65	0.29	nC_4 0.36
60	623	*4.95	*0.53	*0.95
70	671			
71	673			

*Total C_4 and lighter.

Product—	275° F. cut point Gasoline	275°-400° F. Naphtha	510° F. e.p. Dist.	560° F. e.p. Dist.	610° F. e.p. Dist.	Resid.
Cut range, per cent—Gas: 0 to 0.42	0.42	11.27	25.55	25.55	25.55	59.71
Yield, per cent—Gas: 0.42	11.27	25.55	44.12	52.26	59.71	99.59
Gravity, A.P.I.	10.85	14.28	18.57	26.71	34.16	39.88
	69.1	49.2	39.5	38.2	36.2	24.9
A.S.T.M. distillation, °F., at Denver Elevation						
F-1 octane (clear)	55.9	36.3				
F-1 (clear—3.0 ml. TEL)	76.0	53.2				

TABLE 6—DISTILLATION TEST OF CRUDE OF DOWNING-WAGERS 1 WELL, LITTLE BEAVER AREA (UPPER CRETACEOUS), WASHINGTON COUNTY, COLORADO

Gravity at 60° F., A.P.I.	39.4	Pour point, °F.	45.0
Viscosity at 32° F., S.s.U.	Solid	Sulfur, per cent	0.16
Viscosity at 70° F., S.s.U.	51.41	Ramsbottom carbon residue, per cent	1.23

At Denver elevation		275° F. gasoline low temp.		Crude low temperature
Distillation	°F., A.S.T.M. D-86-40	Based on fraction	Based on crude	Noncondensable
5	172			
10	207			
20	285			C_2 0.07
30	359	C_3 2.11	0.48	C_3 1.02
40	490	iC_4 1.49	0.34	iC_4 0.35
50	581	nC_4 8.25	1.87	nC_4 2.33
60	651	*11.85	*2.69	*3.77
70	662	Cracked		

*Total C_4 and lighter.

Product—	275° F. cut point Gasoline	275°-400° F. Naphtha	510° F. e.p. Dist.	560° F. e.p. Dist.	610° F. e.p. Dist.	Resid.
Cut range, per cent—Gas: 0 to 1.08	1.08	23.71	35.21	35.21	35.21	58.82
Yield, per cent—Gas: 1.08	23.71	35.21	47.62	54.03	58.82	99.55
Gravity, A.P.I.	22.63	11.50	12.41	18.82	23.61	40.73
	71.1	48.9	39.8	39.1	38.0	24.9
A.S.T.M. distillation, °F., at Denver Elevation						
F-1 octane (clear)	67.6	34.5				
F-1 (clear 2.0 ml. TEL)	84.1	53.9				

For best results from

Hydraulic Fracturing

...use the proper fracturing and sand-propping agents

by W. E. Hassebroek, Arthur Stegelman, Jr., and S. S. S. Westbrook

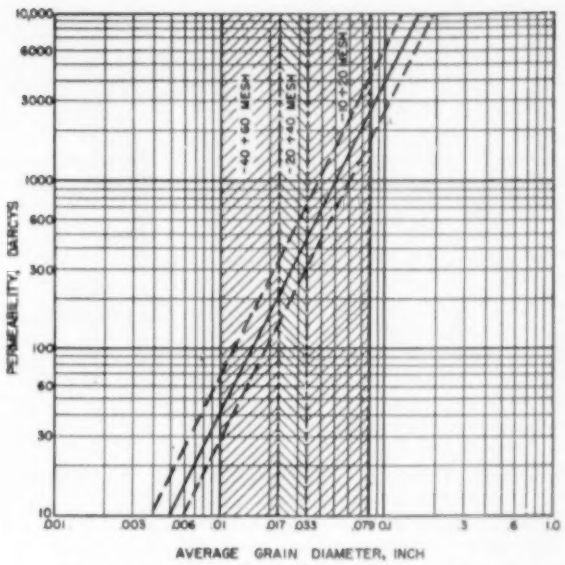


Fig. 1—Approximate permeability of spherical gravels.

SUCCESS of a hydraulic fracturing job is contingent on the proper choice of the materials which actually enter the formation. For the fracturing oil, the viscosity, fluid loss, and compatibility with formation fluids must be considered. For the propping agent, or sand, important factors are the particle distribution, size, and angularity.

Oils with a wide range of characteristics have been used satisfactorily for fracturing purposes. However, some have better qualities than others. Sufficient viscosity must be present to transport the sand-propping agent under a given velocity, but the wide range of well-conditions and treating procedures permits broad variations in this viscosity value. Oils having as much as 500 to 1,000 cp. viscosity at ordinary temperatures may be necessary for deep wells where injection pressures and bottom-hole temperatures are quite high and time of placement is somewhat lengthy, whereas, on shallower wells quite low viscosities are frequently permissible.

A high-fluid-loss oil will tend to filter into the natural permeability of a formation leaving the propping agent behind to deposit prematurely and thus aggravate shutoffs. An oil with a low fluid loss, on the other hand, will have a lesser tendency to leak away into the fracture. High rates of injection may overcome some of the disadvantages of high fluid loss, but where possible, the oil with lesser fluid loss should be chosen.

Not all oils are compatible with fluids existing in the formation being treated. Some refined oils will not blend with native crudes. Furthermore, many formations contain water which may create emulsions when contacted by certain types of fracturing oils. If not properly evaluated beforehand, this can develop into a serious problem. Laboratory tests on unfamiliar oils are usually made to evaluate these various properties.

The use of refined oils as fracturing fluids began in early 1952, and by the latter part of that year, a large proportion of total fracture treatments performed were of this type. The change was not due to ineffectiveness of the previously used hydrocarbon gel-sand method, but to economy. Refined oils proved satisfactory as a sand-carrying medium and were relatively cheap which meant that over-all job cost was reduced or that greater volumes of material could be used for the same amount of money.

The most common refined oils used today are fuel oils, or blends of these. Normally a product is developed for a general area which will satisfy conditions for that area, and is furnished directly from a refinery or is stocked by service companies.

Frequently, it is more economical and convenient for the well owner to use native crude oil from the well being treated, or some other field crude which

Authors are with Halliburton Oil Well Cementing Co. at Duncan, Okla., Oklahoma City, and Wichita, Kans., respectively. Paper presented at 1954 meeting of Mid-Continent District, A.P.I. Division of Production, Oklahoma City.

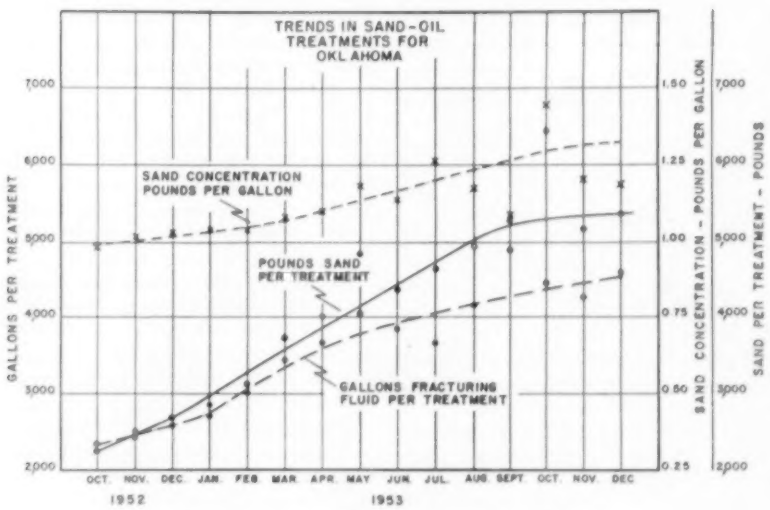

TRENDS IN SAND-OIL TREATMENTS FOR OKLAHOMA
SAND CONCENTRATION POUNDS PER GALLON
POUNDS SAND PER TREATMENT
GALLONS FRACTURING FLUID PER TREATMENT
GALLONS PER TREATMENT
SAND CONCENTRATION - POUNDS PER GALLON
SAND PER TREATMENT - POUNDS
OCT. NOV. DEC. JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEPT. OCT. NOV. DEC.
1952
1953

Fig. 2

is readily available. Many of these crudes have excellent qualities and serve satisfactorily for fracturing work. Certain sections of Oklahoma and eastern Kansas are fortunate in having available low-gravity, relatively high-viscosity crudes, and quite an upward trend in their use has been noted during the past year.

Surfactants stop trouble . . . Any oil pumped into a section of formation is forced through restrictions which may create a high degree of agitation. Any water present in that formation is available for contact with the oil. A mixture of these two fluids under agitation can produce harmful emulsions. However, surfactants, when mixed with crude oils and pumped into the formation preceding the fracture fluid, have been extremely helpful in preventing this occurrence, or in rectifying the situation if it does occur. Some of these surfactants are excellent wetting agents, emulsion breakers, and dispersing agents which serve remarkably in aiding the well to clean up after treatment.

A survey of one service company's operations over a 15-month period showed that 58 per cent of the sand and oil treatments in Oklahoma used a chemical of this type as a part of the treatment. In Kansas during that same period 45 per cent of the wells treated incorporated its use. Very definitely in many cases it performed a much needed action. In others, actual proof of results could not be established; however, it has been considered by many well owners as an inexpensive protection.

For example, reports from eastern Kansas indicate that on wells in which a chemical of this nature is used, the oil recovered after treatment is always in better condition for pipeline or refinery use than on wells in which the chemical was omitted, whereas, observations in the Texas Panhandle indicate, up to now, that such an additive has not been required.

Some wells, during the course of drilling and completion, are damaged by mud or fluid invasion, which impairs permeability. In some instances, first treating with special mud-cleanout agents will aid materially in obtaining better results from fracture treatments. An example is reported from an area near Pratt, Kans. Mud-cleanout treatments there consistently lower fracturing treatment pressures 500-1,000 psi. and result in much easier and faster returns of fracturing fluids used.

Propping Agents

Although the types of fluid may be varied for hydraulic fracturing, experience has shown that the propping agent must be employed if success is to be obtained. Only in rare cases have viscous fluids alone resulted in sustained production increases when injected into formations in an attempt to create fractures. In fact, viscous oil treatments **without** the propping agent have failed to give lasting results, whereas, treatments in the same well and formation using the same fluid **with** the propping agent have been highly successful.

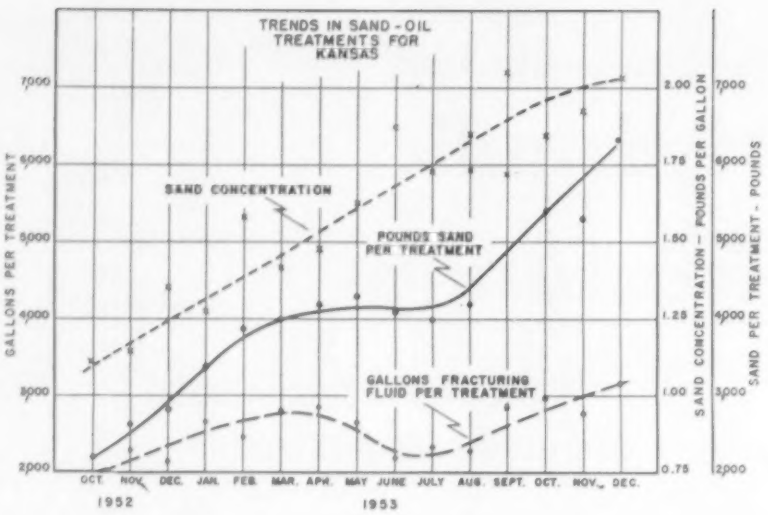


Fig. 3

In the early days of fracturing, ordinary screened river sand was employed as a propping agent. It was learned that this type of material often could not be placed into formations satisfactorily due to bridging within the hole or in subsurface tools. Trouble existed even when improved forms of screening were devised. For this reason, the use of angular-type sands was abandoned and clean, carefully graded, rounded-grain sand was used instead. Immediately, injection difficulties were minimized and this product became standard.

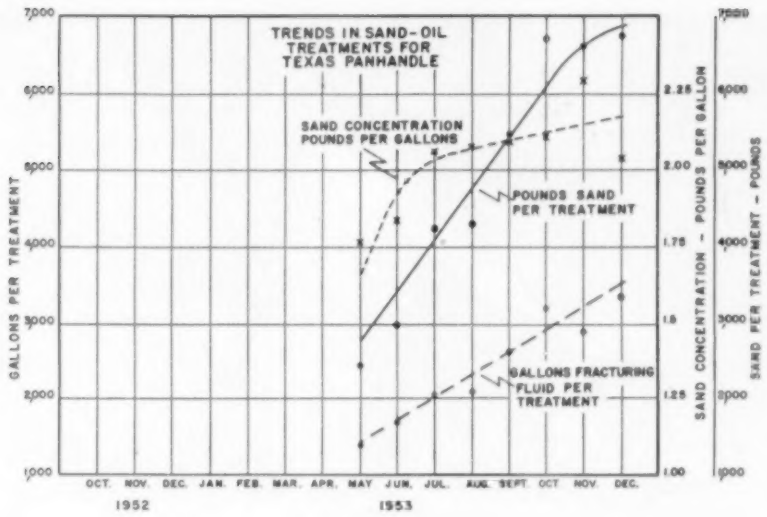
Three important factors in propping agents and their function are worthy of consideration when selecting a material for this purpose—particle distribution, particle size, and angularity. Laboratory studies in which flow capacities were measured through sands under various compressive loads have indicated the importance of uniform particle distribution and particle size. Rounded-grain sands having very narraw limits in particle-size range showed the flow capacity to decrease more or less uniformly as the compressive load increased. The larger the grains, the greater the flow capacity under each corresponding load. Sands having a wider range in particle size exhibited good flow capacity under reasonably low applied pressure, but decreased sharply as the load was raised. The nonuniform mixture permitted a crushing of the larger grains before the load reached the mass of uniform particles. The resulting mixture of crushed fines and remaining unaltered particles exhibited less permeability than that provided by smaller grains of uniform size.

Additional tests have shown that angular-type sands under compression will permit as much as 20 per cent greater reduction in permeability. The nonuniformity produces an uneven supporting action to the load applied, resulting in greater crushing action.

Provide permeable path . . . Benefits derived from the sand used in hydraulic fracturing are believed to be the result of propping within a fracture to provide and preserve a more permeable path for fluid flow. Fig. 1 shows approximate permeability versus average grain diameter. The dotted lines indicate the variation that might be found because of difference in packing. From this it is obvious that permeability in a mass composed of spherical grains increases with grain size. Further, even the smaller, yet spherical, grains used in fracturing, these being down to plus 50 mesh, have mass permeability much greater than occurs naturally in many formations.

In spite of these facts the relative grain size is still of great importance for the larger the grain, the greater will be the remaining propped-open fracture width. Fracture flow capacity is the result of fracture width times grain permeability within the fracture.

Wilsey and Bearden[1] have shown that where the fracture flow, or carrying, capacity is of low order, recovery increases rapidly with small in-


TRENDS IN SAND-OIL TREATMENTS FOR TEXAS PANHANDLE
SAND CONCENTRATION POUNDS PER GALLONS
POUNDS SAND PER TREATMENT
GALLONS FRACTURING FLUID PER TREATMENT
GALLONS PER TREATMENT
SAND CONCENTRATION - POUNDS PER GALLON
SAND PER TREATMENT - POUNDS
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1952
1953

Fig. 4

creases in fracture capacity. This holds true up to a fracture carrying capacity of about 200 md.-ft. after which even large increases in fracture capacity give only small increases in recovery.

Some disappointing results of fracture treatment in deeper wells may possibly be explained by the above statements. In these cases, even though sand entered the fracture, a high flow capacity did not result due to crushing or imbedding as a result of the high overburden pressure at such depths. This would indicate need for use of larger amounts of sand of the largest practically obtaintable grain size. A practical problem sometimes arises here in that some deep wells offer great resistance to entry of large grain and high quantities of sand thereby demanding careful control in such instances.

All factors considered, the most efficient propping agent is one in which the particles, (1) are rounded in shape, (2) are relatively large in diameter, and (3) have a minimum variation in size.

Sand backflow . . . A problem often encountered in hydraulic fracturing is that of sand returning into the well bore after the treatment. One approach to this problem has been overflushing of the tubing or the casing, utilizing in many cases, the carrying medium itself. It is reported that in most instances this method greatly decreases the amount of sand returning.

But why is this so and what is taking place? If the sand is not coming back as much as on wells not utilizing overflushing, then, other conditions remaining the same, the sand is being transported farther from the well bore. This would seem logical since the flushing oil does not contain sand and yet has the same physical properties as the oil preceding it.

Where is the sand most needed? It is generally agreed that it is necessary to have sand in the fracture at the wall of the hole. Perhaps, in many cases, the backflow of sand is being controlled at the expense of oil production. This might account for those wells which have a very rapid decline after fracturing. Reliable reports state that certain formations can be fractured and helped for short periods of time by fluids not containing sand. However, these fractures seem to heal in a short period; and production drops off rapidly within a few days or weeks, although wells fractured nearby, utilizing sand, continued to produce at much higher rates.

An interesting thing to note is that some wells that have become sand-plugged during treatment have turned out to be among the better wells of field when placed on production. Perhaps this was because they were not overflushed.

Another approach has been to follow the regular fracturing sand with a small amount of angular sand which would tend to dig into the formation and retain the fracturing sand behind it. Again, this would seem plausible and cases have been reported where such practices have seemed to prevent the sand from coming back into the hole; however, this also might endanger the critical region of the fracture.

Certainly, the place most desirable to have a high permeability is **at the approach** to the well bore, and angular sands do not have as high a permeability as rounded-grain sand. Also, angular sands, due to stress concentrations, fail more readily under compression than do rounded grains. These failures can occur under overburden pressures encountered in many wells. If such were to happen, the fines would tend to greatly reduce the fracture permeability.

Allow pressure to decrease . . . It has been noted on many jobs that the amount of sand flowing back into holes is greatly reduced if the wells are closed in for a few hours until the pressures created by the fracturing treatment naturally decrease to normal values, or else are very slowly bled off, thus enabling the formations to settle upon the grains and hold them in place. Although allowing the formation to reach equilibrium after treatment may not completely prevent the propping agent from entering the well bore, it would seem that perhaps it might be better to tolerate some sand if the well would benefit economically from so doing.

Starting the fracture and gaining sand entry has been difficult in certain areas. Some wells tend to take the sand more readily than others and in different concentrations. There are formations that tend to seal off if the ordinary concentrations of sand are used to start the fracture and yet after the fracture has been started, seem to be capable of taking very high concentrations.

To combat the conditions of plugging off initially, several procedures are being used. One method practiced is that of starting the treatment using relatively fine sand to create the initial wedge, followed by regular sand to extend the fracture. Another is to start the treatment with a low concentration of regular sand. A third is to start the fracture with no sand in the carrying medium but adding it later and gradually increasing its proportion to the amount required.

This latter procedure is quite desirable because the possibility of plugging with a carrying medium containing no sand is improbable and, in addition, the sand throughout the treatment would be uniform and present less chance for restrictions to occur due to sand gradations.

Trends in Mid-Continent Area

The trends in size of sand and oil treatments within the Mid-Continent area are shown in Figs. 2, 3, and 4, which were compiled from data on over 7,000 wells. Fig. 2 shows that in Oklahoma the average gallonage of fracturing fluid per treatment has increased from approximately 2,300 gal. in October 1952, to nearly 4,600 gal. in December 1953. The average sand weight per treatment has climbed from 2,200 lb. to about 5,400 lb. during the same period, this being a rise from 1 lb. of

sand per gallon to 1½ lb. per gallon throughout that interval of time.

In certain sections of the state, 15,000 to 30,000 lb. is common with an occasional 50,000-lb. injection being conducted. Considering that several treatments are often performed on the same well, perhaps in individual zones, the total amount of sand pumped into some wells is very large.

In Kansas . . . Fig. 3 shows the volume trend of treatments in Kansas. The average amount of fluid per injection has followed a somewhat irregular path, but at the end of 1953 had reached a volume of 3,200 gal. The average sand per treatment has simultaneously moved upward from 2,300 to about 6,300 lb., a change in concentration from 1.1 lb. per gallon to more than 2 lb. per gallon. Activity in eastern Kansas has increased sharply with quite a number of treatments incorporating 10,000 to 15,000 lb. of sand in the ratio of 2.5 to 3 lb. per gallon of treating fluid.

In Panhandle . . . The trend in the Texas Panhandle is pictured in Fig. 4. It was not until May 1953 that any great amount of fracturing work was performed in that area. Here again the increased trend is observed. Fluid volumes have risen from 1,300 gal. per treatment in May, to about 3,500 gal. at the year's end. Sand used has increased accordingly with a sand concentration of over 2 lb. per gallon being prevalent throughout most of the period.

Observations from other areas show similar trends. Treatment gallonage and quantities of sand vary depending upon formation characteristics, well conditions, and general experience within the area under consideration. Comparing the treatment size of today with that of the early fracturing period when 800 gal. of fracturing fluid with 400 lb. of sand was considered typical, it can be seen that considerable change has taken place.

Mixing and Proportioning

In early sand and oil work, sand concentrations were kept low on most jobs, and seemed to give a minimum of trouble; however, with the advent of higher concentrations of sand, and larger volumes, certain problems have risen, which have placed greater importance on blending and proportioning.

Two general methods of proportioning and blending sand and oil ingredients are in use today. One employs the addition of sand and oil through mixers in a continuous process. The other uses a large batch mixer, wherein prescribed amounts of sand and oil are added and agitated together. Both of these methods have certain advantages and disadvantages.

Fig. 5—This proportioner-blender is a recent introduction to the effort for controlled handling of sand in oil for fracture treatments.

From numerous observations of jobs and procedures, it appears that blending and proportioning equipment should be capable of doing the following:

1. Changing the sand concentrations over wide ranges at any time during the fracture treatment.
2. Controlling and measuring the sand concentration going into the well at all times.
3. Mixing large volumes.
4. Operating at high rates of injection.

In general, it seems that most of the formations in the Mid-Continent area will take at least 1 lb. of sand per gal. without undue trouble; however, some formations have failed to take higher concentrations. Others will take higher concentrations only when they are started low and gradually increased.

For example, wells near Borger, Tex., producing from Granite Wash formation will plug if oil containing 1 to 2 lb. of sand per gal. is used in the first part of a treatment. By starting with ½ lb. per gal. and slowly increasing the proportion as pumping proceeds, 3 lb. per gal. can be injected with no difficulty.

On other jobs, treating pressures have been lowered from dangerous values to safer ones by rapidly decreasing the amount of sand being mixed with the carrier. Very often the forewarning of a sandout in some areas is a gradually increasing pressure while treating the formation with a constant sand concentration. In other formations they are indicated by high, almost instantaneous increases in pump pressures. In the trend of ever-increasing sand concentrations, the mixer should be capable of bringing the mixture up to relatively high values to put in as much sand as safely possible, but should also be capable of decreasing this concentration at the first signs of plugging.

There are areas such as those around Healdton, Cushing, and Blackwell, Okla., and parts of Kansas, where it is believed that high injection rates have proved beneficial to well production. On the other hand, there are also areas near Duncan, Shawnee, Bristow, and Cushing, Okla., where various injection rates were utilized with no apparent difference in results. These various rates used were naturally sufficiently high to prevent the screening or settling out of the sand.

It would seem that a blender meeting the above requirements would necessarily be of a continuous type in order to enable it to mix large volumes at accurately measured, specified concentrations and also be capable of changing these concentrations at any time. Fig. 5 is a photograph of equipment now in use which is capable of accurately measuring the sand and oil in various proportions, over a wide range of values at high rates of blending.

Reference

1. Wilsey, L. E., and Bearden, William G.: Reservoir Fracturing—A Method of Oil Recovery From Extremely Low Permeability Formations. A.I.M.E. Paper No. 317-G, presented October 21, 1953.

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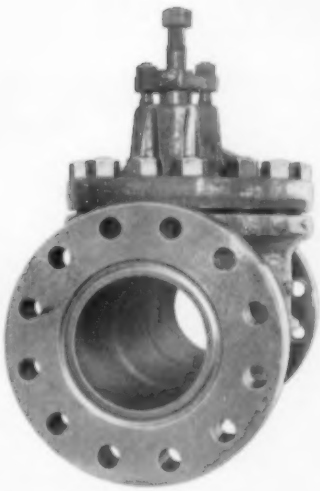

Fig. A706-9 7" API Series 900
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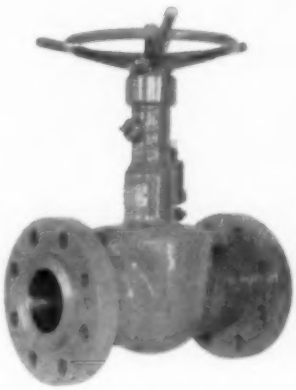

Fig. LP402-6 4" ASA 600 Lb.

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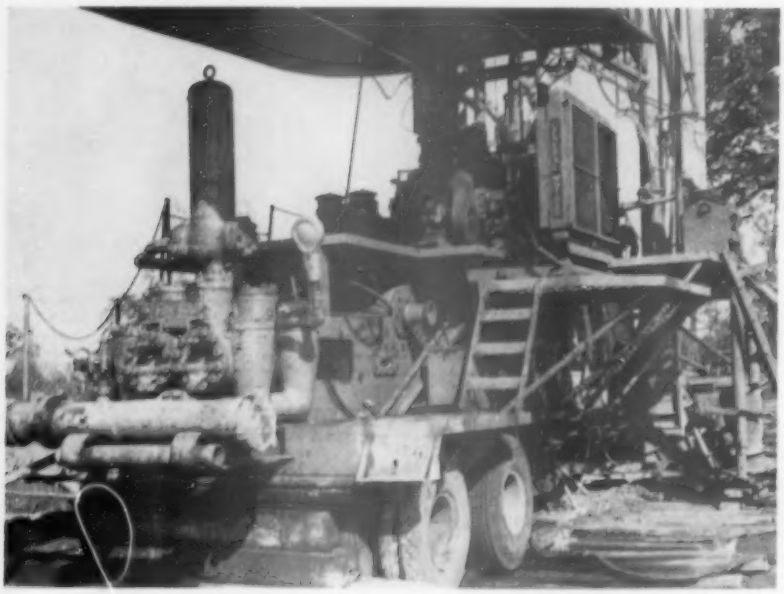


ONE TRAILER carries Crow Drilling's Rig 19 draw works, mud pump, rotary table, and drilling engine, Fig. 1.

New rig loads on two trailers

by Ed McGhee

CUSTOM designed and built, Rig 19 of the Crow Drilling Co., Shreveport, La., incorporates all major rig equipment in two trailer loads. Currently drilling in East Shuler field of Union County, Arkansas, the rig has drilled to a depth of 6,840 ft. with 3½-in. drill pipe.

One of the trailer sections carries the mast, which is transported in three easily reassembled sections. Moreover, it is not necessary to unstring the drilling lines from the crown and traveling blocks during moves.

The other trailer section contains the draw works, drilling engine, and slush pump. The unusual features of the equipment can be seen in Fig. 1. The draw works is located under the floor and, therefore, an independently driven catworks is used. It is located on a side adjacent to the driller's position. An 8-hp. air motor operates the catworks, and is remotely controlled by the driller. Air for this and other services is furnished by a compressor which is permanently mounted on the trailer.

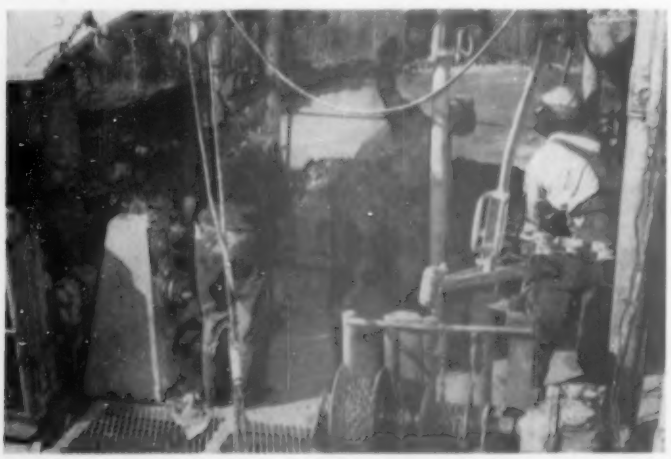
The slush pump is immediately adjacent to the drilling engine, thereby eliminating extensive power-transmission mechanism. The pump may take suction from either side merely by changing the suction hose to the desired end of the intake header. The mud line from pump to standpipe is permanently mounted along the trailer's side.

The draw works has only one brake flange, and it is located on the outboard side of the draw works shaft bearing. This arrangement facilitates quick, easy changing of the brake linings.

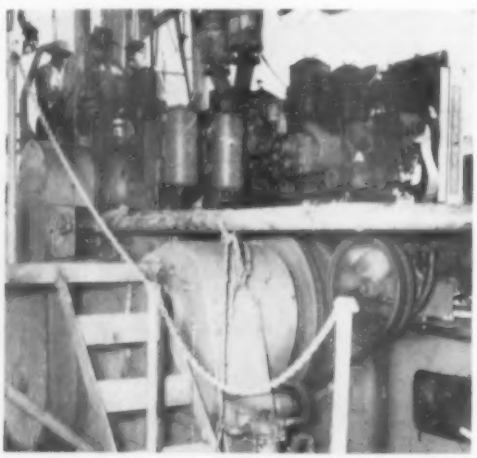
Pump liners and valves may be changed without any rearrangement whatsoever. Also, the engine is easily accessible for servicing and adjustment. In the event of major repairs or overhaul, the various components of the trailer may be separated by unbolting the connections.

West Texas drillers rent two-way radios

WHAT is probably the only rental radio-communication service catering especially to the drilling industry is now operating in West Texas. Drilling rigs, logging units, tool-pushers' cars, and trucking-contractors' vehicles are connected into common-carrier system which covers probably the largest area of any of its type presently operating in the country.



THE CAT WORKS at lower right is independently driven by an air motor. The draw works is located under the floor, Fig. 2.



CLOSE PROXIMITY of drilling to draw works and pumps shortens the power-transmission distance, Fig. 3.

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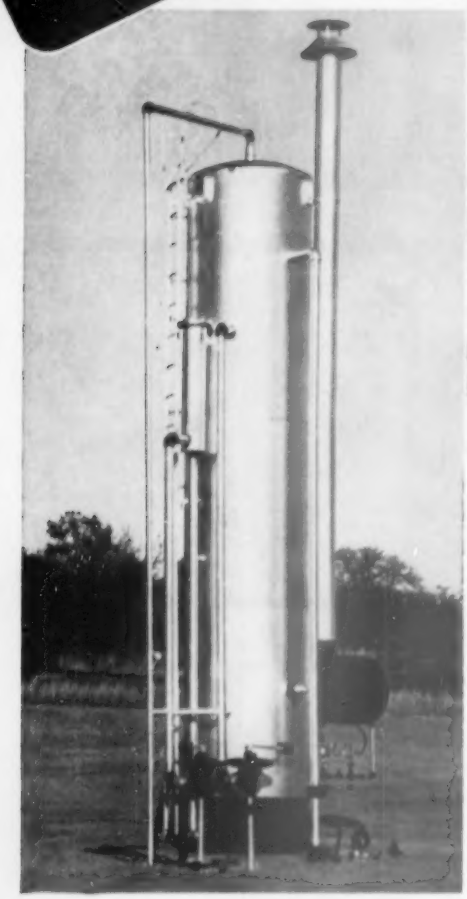

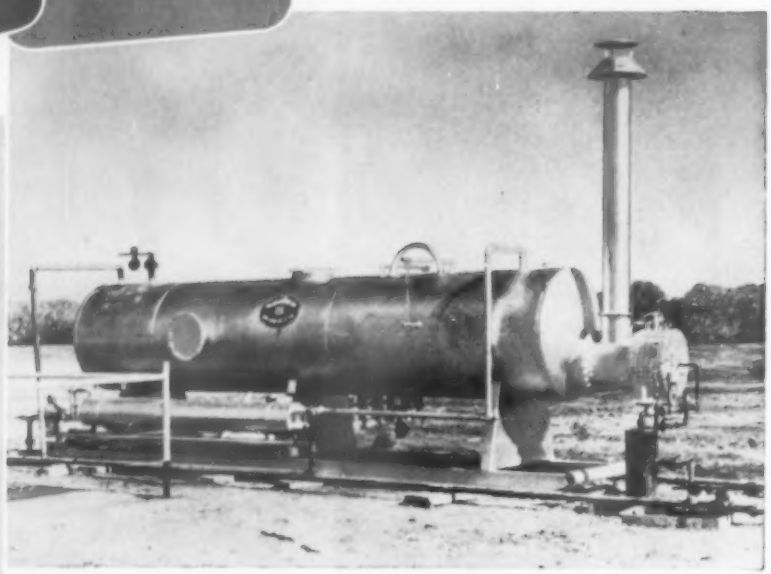

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Besides providing two-way radio service to companies not caring to operate their own communication system, the Permian Basin Communications Co., or Permco, of Midland, Tex., also maintains a 24-hour per day dispatcher service so that its customers leave or receive messages, materials orders, service requests, or drilling reports.

An increasing number of the drilling contracts awarded in West Texas contain a provision that the rig must have radio communications. Also it is important that hydrocarbon logging units be equipped with two-way radio so that a minimum of time will be lost when a show is logged.

No investment required . . . Because the radio equipment is leased, not sold, the contractor using the service has no initial equipment investment to make. He has only a definite, known sum to pay periodically and is not responsible for normal maintenance. This feature of the service is particularly attractive to smaller organizations which cannot economically justify the purchase of a complete communications system of their own.

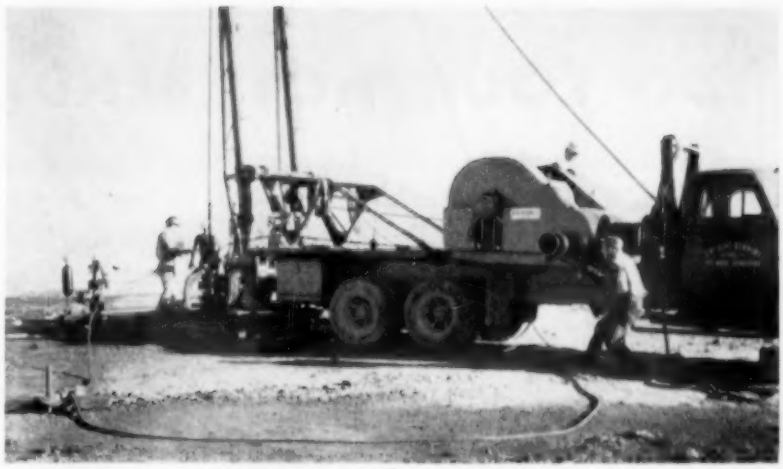
The advantage of having a full-time dispatcher service was apparent recently when a well in the Midland area caught fire. Because the rig was equipped with radio and a message was transmitted immediately to the dispatcher, a fire truck was on its way to the well within 2 minutes of the first explosion. The fire was extinguished before heavy damage could be caused.

In other instances, ambulances have been dispatched to the scene of rig and highway accidents.

For those companies not maintaining around-the-clock office hours, drilling reports may be given over the air to Permco's dispatcher. When the company's offices open in the morning, the reports may be turned over in one group.

Expansion planned . . . Presently, the only operating transmitting - receiving tower in the system is at Midland. However, towers have been constructed at McCamey, Seminole, and Sterling City; and another is slated for Roswell, N. M. The new towers will be equipped with relays so that any message from a remote rig will be picked up by the nearest antenna and automatically relayed to Midland.

Where the present system has an operating radius slightly in excess of 50 miles, the new installations will give additional coverage of 70 miles in all directions from the relay transmitters.



"Endless" spinning line speeds work

FOR well - service jobs, J. P. (Bum) Gibbons of Midland, Tex., uses an "endless" spinning line for a pulling unit which is a time and labor saver. The cathead on most well - servicing units is far back from the well and it is difficult to rig a one-piece catline for continuous spinning. owever, "Bum" uses two pulleys, one is attached to a stake driven some distance out from the cathead side of the unit. The other pulley is usually attached to the christmas tree which has been spotted in a convenient location.

In operation, the one-piece line, approximately 60 ft. long, is threaded through the pulleys and taken over the cathead. The usual wraps are made around the collar above the slips when going into the hole. Then the loops are slipped up on the joint after it has been stabbed and the joint is rolled up tight. The process is reversed when coming out of the hole.

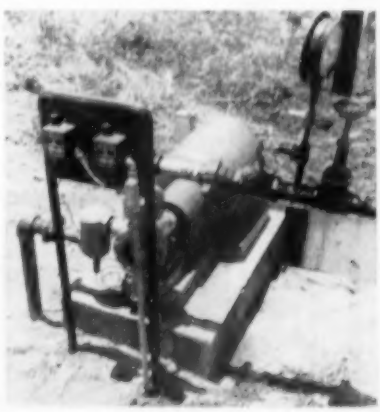
Water well gets automatic controls

WHEN Richfield Oil Corp. recently rejuvenated its Soladino properties in Casmalia field of coastal California after the wells had been idle for 28 years, no fresh-water sands could be found on the property. Nearest fresh water was some 2 miles away, over an 800-ft. ridge separating the two valleys.

Accordingly, the well was drilled and facilities installed to pump water to a 1,000-bbl. storage tank erected on the ridge. Controls used to insure automatic operation of the pumping facilities were a little different from those ordinarily employed.

The 200-bbl. tank used at the well site was equipped with high and low float-operated mercury switches. These automatically control operation of the vertical pump used in the shallow well. Similar switches also regulate operation of the 15-hp. motor used to drive the centrifugal transfer pump, rated at 125 g.p.m. at an 800-ft. head. However, temperature switches also were installed to insure the transfer pump being shut down in event the high-level switch fails to function.

Operation of the high - level float causes flow of water to cease. The pump thereby comes to a "static" condition, which causes an increase in temperature of the water being churned. An increase to 130° F. causes one temperature controller to function and shut down the pump. A second controller is set to operate at a temperature about 15° F. higher if for any reason the first fails to function.



AUTOMATIC temperature controls shut down the motor when water temperature increases in the pump.

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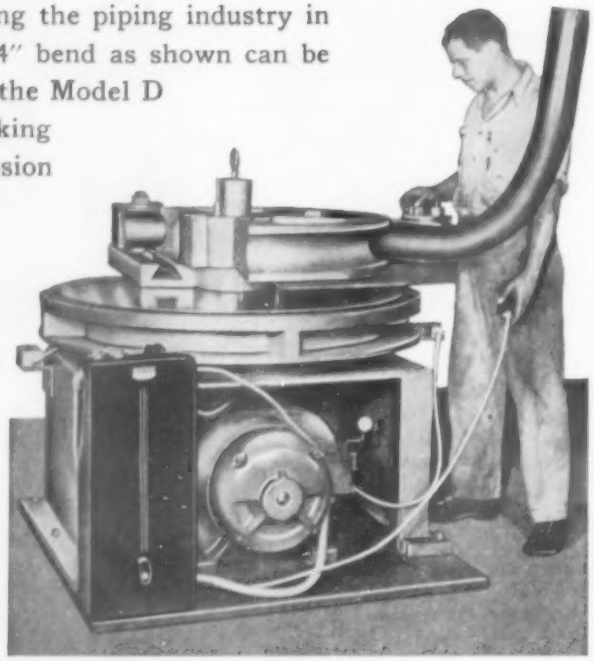

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Increasing Pipeline Capacity With Centrifugal Compressors—1

by Harold Woodhouse

IT is a symptom of the modern age that no piece of machinery or equipment, although purchased originally with ample capacity for handling the job for which it was intended, can long be left to operate with its comfortable reserve margin. Either by choice or pressure of events, we demand that it shall give its all.

Squeezing extra capacity out of a pipeline definitely belongs in the category of pressure of events—and, literally, one way to obtain it is with more pressure in the line.

For a specified line having a compressor-station discharge pressure P_2, a compressor-station suction pressure as shown by the pipeline characteristic curve and operating at a flow corresponding to point A on the characteristic with a suction pressure P_1 these conditions will be as shown by Fig. 1.

Assuming, for the moment, that this flow is being handled by one centrifugal compressor. Its compression ratio will be, then:

$$r = P_2/P_1$$

Operation envelope . . . If, to the same coordinates, and for the same compressor discharge pressure P_2, we plot the suction pressures of a specific centrifugal compressor for various speeds and capacities, we will have an envelope as shown in Fig. 2, which defines the complete range of operation possible for the compressor at the speeds given.

In this connection it should be pointed out that while 110 per cent should ordinarily be considered as the maximum possible operating speed because the impeller stresses will then be approximately 21 per cent above their normal values, the minimum speed is dictated by the speed range of the prime mover. Thus, as far as the compressor is concerned, it would operate at any lower speed which would satisfy the pressure or capacity requirements.

Constant Q/N . . . For all points on the curve marked "Constant Q/N Line," the compressor efficiency will be virtually constant, and since this line as shown passes through the design point it should correspond to maximum efficiency. Other lines of constant Q/N could be drawn within the envelope, but they would correspond to lower efficiencies.

It can be then seen that the compressor can operate at maximum efficiency at any speed between maximum and minimum and that this maximum efficiency can be extended for speeds below 80 per cent if the requisite prime mover is available.

Since Q/N is the gas flow in cubic feet per minute divided by the r.p.m., this ratio represents the gas delivered in cubic feet for each revolution of the impeller. So, for constant Q/N corresponding to maximum efficiency, the volume of gas delivered will be directly proportional to the speed.

It must be carefully noted that the Q value in the Q/N ratio always refers to the gas at compressor-inlet suction conditions so that the same Q/N and Q values represent a greater number of standard cubic feet when the compressor is operating with a high suction pressure than when it is lower.

If the design point for 100 per cent speed and capacity of the compressor is also for the same suction pressure P_1 thus corresponding to point A of Fig. 1 and if its discharge pressure P_2 is the same, we can superimpose the performance envelope of Fig. 2 on Fig. 1 as shown in Fig. 3.

Then the possible range of operation for this compressor in maintaining discharge pressure P_2 will be from point B on the pipeline characteristic curve to point C and operation will be at all times somewhere along line BAC.

(The author's previous article on centrifugal compressors appeared in The Oil and Gas Journal, February 15, 1954, p. 166.)

Author is chief engineer, Dean Hill Pump Co., and consultant on compressor design.

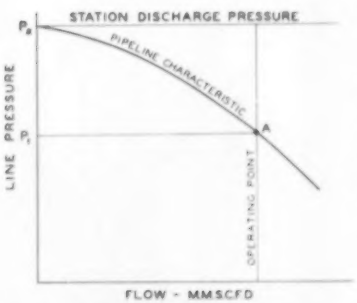

Fig. 1—Pipeline characteristic curve. P_1 is suction pressure and P_2 compressor-station discharge pressure.

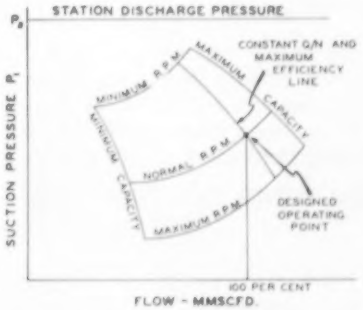

Fig. 2—Envelope, obtained by plotting different suction pressures for various speeds and capacities at same discharge pressure.

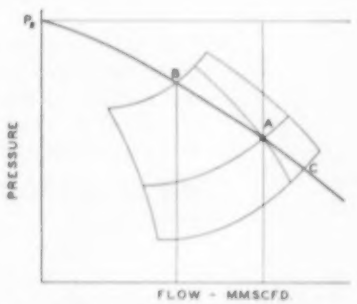

Fig. 3—If conditions are such that performance envelope of Fig. 2 can be superposed on Fig. 1, operation will be along line BAC.

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When used as a pressure gauge, the instrument contains a helical Bourdon tube, secured at one end. Rotation of the free end is transmitted directly to a stylus, ① which makes a permanent record on a clock-driven metal chart.

The simple operation of replacing the pressure element with a thermometer element, changes the RPG-3 into a recording thermometer. Further details concerning the instrument may be obtained directly from the manufacturer, Geophysical Research Corp., Tulsa, Okla., through whose courtesy the illustrations and technical material on this page were supplied.

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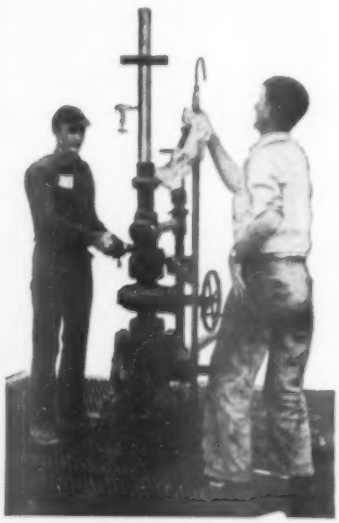

Controlling Crooked-Hole Tendencies

by H. B. Woods

DRILL-COLLAR size and weight on bit are the two most important factors in controlling crooked hole. Roughly an increase in collar o.d. of 30 per cent will permit doubling the weight. These conclusions have been field proven and now the use of oversize collars such as 8-in. collars in 8¾ or 9-in. hole is standard practice among some operators.

Experience in Jumping Pound field in western Canada shows crooked-hole problems were minimized and drilling costs greatly lowered by the use of one stand of 11¼-in. collars in 12¼-in. hole as compared to 6 to 8-in. collars in 8⅝ to 9-in. hole. I understand that there are now three strings of 11¼-in. collars in Canada and there is one string being used in Pennsylvania. All of these are being used in 12¼-in. hole and they are paying off due to the fact that it is not necessary to fan bottom to keep the hole straight.

A definite measure of these advantages may be obtained from Fig. 1, which shows the weight per inch of hole diameter with which acceptable deviation may be maintained as related to collar size. Each curve is for a formation having a certain crooked-hole tendency. Formation "f" is a severe crooked-hole formation. If, for example, acceptable deviation may be maintained with 8-in. drill collars in a 9-in. hole with 1,400 lb. per in., then the same deviation may be maintained with 11¼-in. collars in 12¼-in. hole with 2,500 lb. per in.

The Mid-Continent A.P.I. Study Committee on straight-hole drilling is sponsoring several projects on problems related to the control of hole deviation. One is a study of the possibility of accepting high-angle holes provided doglegs are not severe.

Another is the determination of the number of oversize drill collars to be run below smaller collars for obtaining minimum hole deviation. Still another is the effect of a stabilizer in the drill-collar string. The problem is complicated. For every combination of stabilizer position, weight on bit, and other factors, we need to know the hole-straightening effect as compared to the combination without the stabilizer. The calculations are so involved that we were forced to use a high-powered calculating machine.

Slim holes . . . There seems to be wide differences of opinion as to the economies in slim-hole programs. I believe the actual answer is that in some conditions a slim-hole program does result in reduced costs while in others the converse is true.

Maintaining acceptable drilling rate in crooked-hole formations is more of a problem in small holes than in large holes. For example, referring to Fig. 1 again, we see that if acceptable deviation may be maintained with 8-in. collars in 9-in. hole with 1,400 lb. per in. of hole diameter, then it is necessary to reduce the weight to 400 lb.-per-in. of hole diameter if 3½-in. collars are used in 4¾-in. hole. In some formations, penetration rate would be almost nil with a weight of 400 lb. per in.

Neglecting crooked-hole problems, very hard formation may require extreme weights for efficient drilling, say 5,000 lb. per in. of bit diameter, which is in the range of load-carrying capacity of large bits but above the capacity of the smallest bits. In very soft formations long rock-bit teeth are necessary for fast drilling. New types in the smaller sizes especially designed for these very soft formations are being developed and are showing promise. However, because of space limitations, teeth on small bits must necessarily be shorter than on large bits.

Because of the above considerations, much higher rock-bit efficiency must be expected with larger rock bits in

1. Crooked-hole formation if a specified hole deviation is to be maintained.
2. Very hard formations.
3. Very soft formations.

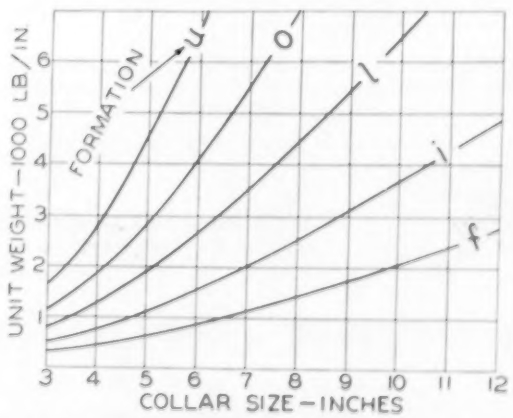

Fig. 1—Influence of drill-collar size on weight that may be carried per inch of hole diameter.

Author is with Hughes Tool Co., Houston.

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Separation of Natural-Gas Liquids—6

by John M. Campbell

A sample calculation is given in this final installment of the series.

IN order to illustrate the procedure, let us consider Gas A at 900 psia. in some detail. To arrive at the optimum temperature for maximum revenue, it is necessary to use Fig. 6 (Installment No. 4) and Fig. 9 (Installment No. 5). It may be assumed that stabilization is being used. The gross price of liquid has been assumed to be $0.07 per gal. and the gas $0.12 per M.c.f. By tabulating the revenue at various temperatures, approximately 20° F. is found to offer the greatest revenue. For a higher gas price the optimum temperature would be higher. Inasmuch as the hydrate temperature at 900 psig. is approximately 68° F. (Fig. 11), 70° F. is the lowest normal separator temperature that may be safely considered.

If the pipeline company were to place maximum heating value and/or gallons per thousand specifications of 1,300 B.t.u. per cubic foot and 0.5 gal. per thousand respectively, the following separation temperatures would be required:

Gallons per thousand —22° F. (Fig. 8, Installment No. 5).

Gross heating value —88° F. (Fig. 10, Installment No. 5).

Therefore in this example not only would 20° F. give optimum revenue but would also meet all pipeline hydrocarbon specifications. At 20° F. the water content would not exceed 5 lb. per M.M.c.f.d., which would also meet any requirements in that regard.

Economics . . The optimum temperature found above considered only revenue and not the cost of the equipment needed. Therefore it is necessary to go one step further and determine the income per dollar of investment. For simplification it has been assumed that all low-temperature equipment will operate at 20° F. and all standard equipment at 70° F. The following system has been chosen for study:

Flow rate: 5 M.M.c.f.d.

Flowing pressure: 2,100 psig.

Flowing temperature: 120° F.

Separation pressure: 900 psia.

Separation temperature: As above.

Analysis: Gas A (Table 2, Installment No. 4).

The results of the study are shown in Table 4. The gross payout time shown has no real significance, with the rich gas used as an example, because it is quite short in all cases. The gross yearly revenue after payout is far more significant and gives a better comparison of the systems. Using these figures, little difference exists between the low-temperature

TABLE 4—SUMMARY OF ECONOMICS IN EXAMPLE

System	Equipment Cost	†Daily Revenue	Gross Payout Days	Gross Yearly Revenue After Payout (350-day-year)
Expansion refrigeration without hydrate inhibitor				
Three-Stage Separation	$ 9,200	$ 802	11.4	$272,000
Stabilization	$13,500	$1,186	11.4	$414,000
Glycol injection				
Three-Stage Separation	$10,600	$ 802	13.2	$270,000
Stabilization	$15,000	$1,186	12.6	$410,000
Separators, choke and heater				
Three-Stage Separation	*$ 5,900	$ 870	6.8	$298,000
Stabilization	*$15,700	$1,146	13.7	$385,000

*Does not include cost of dehydrator (about $5,600). None needed on low-temperature units. †Based on $0.12 per M.c.f. for sales gas and $0.07 per gal. for liquid.

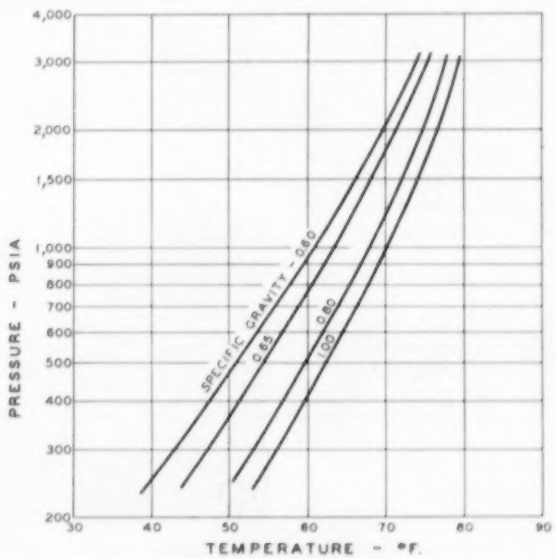


Fig. 11—Typical hydrate-forming conditions for natural gas.

Author is manager of process equipment department, oil and gas division, Black, Sivalls & Bryson, Inc., Oklahoma City. Paper presented at Ninth Annual Short Course on Gas Technology, Texas A. & I. College, June 1954.

stabilization systems, with and without hydrate inhibitors, on the cost basis alone. The final choice would then depend on the following:

1. Rate of decrease of flowing pressure, if any.
2. Operating preference between the two units.
3. Slightly higher operating cost of glycol injection.

Item one becomes the most critical item from the standpoint of economics for as the pressure drops below 2,100 psia. the separator temperature will rise, in the absence of hydrate inhibitor, since the temperature ahead of the choke is limited by the hydrate point. If any doubt therefore exists, the glycol-injection system should be used or provision for future glycol injection provided. The former offers the smallest ultimate investment.

The results obtained here have general application only. If the analysis had contained a higher percentage of heavy ends, stage separation would have been relatively more attractive. A decrease in this percentage would in turn be reflected by increased advantage to low-temperature separation. Therefore it is necessary to analyze each case on its own merits.

Diethylene glycol has been considered as the only applicable hydrate inhibitor for process and cost reasons. The operating cost is less because of high recovery efficiency, whereas material such as methanol would be totally lost.

No attempt has been made to tabulate the economics of using mechanical refrigeration. This process is more complex and a subject within itself.

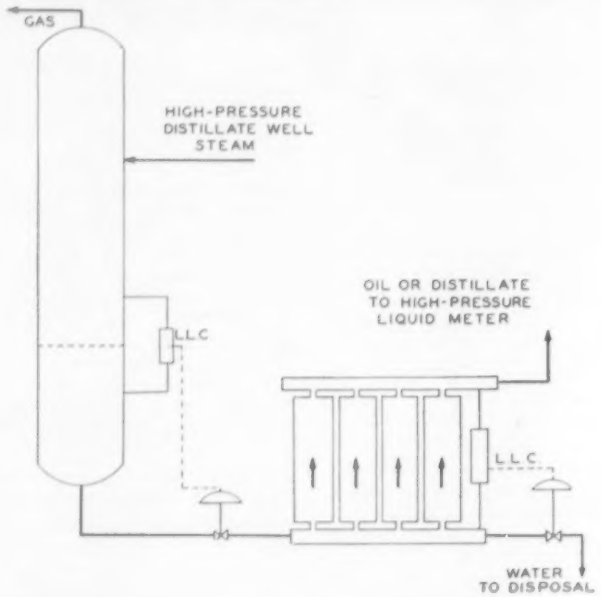
Conclusion . . . In order to fully utilize the potential revenue, the following procedure should be undertaken to obtain optimum separation:

1. Obtain a full well-stream analysis or separator-liquid and gas analyses together with gas-oil-ratio temperature and pressure in the separator. (Note—Any well should be flowed, at a rate high enough to prevent liquid buildup in the tubing, for 24 hours before sampling.)
2. By using flash calculations and other such means, determine the recovery at the separator conditions under consideration.
3. Determine the separation conditions to meet any gas-sale specifications.
4. Determine the investment necessary for the alternative systems.

The above approach involves an investment of time and money, but will ultimately result in maximum revenue. Although low-temperature separation is an excellent process approach and normally shows advantage, it is not a cure all to separation problems. The same conclusion must of necessity be drawn for stabilization versus stage separation. Therefore it is always advisable to examine each system in detail.

Acknowledgement

The author wishes to acknowledge the assistance of T. D. Cleary, Black, Sivalls & Bryson, who assisted with the calculations.



LIQUID-LEVEL controller governs flow of distillate or oil from separator into lower header.

Water Knockout on Distillate Separator Made from Discarded Casing

A WATER knockout chamber on a high-pressure distillate-separator setup was constructed by utilization of discarded casing on a Plymouth Oil Co. lease in Sinton field, Texas.

The casing was cut from four parallel chambers, each appropriately capped and tying into headers at each end. The chambers are supported vertically while the headers run horizontally, one above and one below the chambers.

FOUR parallel chambers provide large volume permitting lower velocity so that water can drop out of distillate.

A liquid-level controller governs the flow of distillate (or oil) from the separator into the lower header. From here, the distillate enters the four parallel chambers, and its velocity is considerably reduced due to the large volume thereby provided.

The lower velocity allows the water to drop out of the distillate and this water is withdrawn by means of a liquid-level controller valve which draws off water from the lower header. Meanwhile, distillate is withdrawn through the upper header and goes to a high-pressure liquid meter.

This particular equipment has been in operation several years and its performance has been quite satisfactory.

How to Design In-Tank Jet-Mixing Systems—1

IN this series, present tank-mixing techniques of recirculation and propeller mixing are discussed and compared with in-tank jet mixers. Procedures are presented for the design of in-tank jets for blending tetraethyl lead with gasoline and for general mixing problems.

Findings of this report indicate the following standings for each mixing technique for the criteria mentioned.

	Normal recirculation	Propeller mixers	Recirculation through in-tank jets
Installation cost	Low	High	Low
Power operating cost	High	Low	Low
Pump and pipe requirements	High	Low	Medium
Tankage requirements	High	Low	Low

As can be seen from the table, in-tank jet mixing frequently offers definite advantages in low installation and operating costs. It is therefore recommended that it be considered for mixing gasoline in blending tanks from operation and economic viewpoints when new facilities are required or existing facilities are being modernized.

Object . . . Homogeneous mixing of tetraethyl lead and gasoline is necessary if a product of uniform antiknock rating is to be marketed. Possible advantages of improved mixing are:

1. Savings in power costs for mixing.
2. Savings in construction costs by simplifying the necessary installation.
3. Savings by reducing other plant investment required for mixing and blending, such as pumps, pipelines, and tanks.

This series discusses several systems of mixing and presents a brief method for an economic evaluation to find the most suitable system for any particular set of conditions. Due to the favorable showing of an improved mixing technique utilizing in-tank jets, developed by H. Fossett and L. E. Prosser at the National Physical Laboratory in England, a simplified design procedure for in-tank jets is included.

This material from E. I. du Pont de Nemours & Co., Inc.

Present methods . . . Over the past 25 years, many methods have been proposed for the uniform mixing of gasoline and TEL in tanks. Recirculation and in-tank propeller mixers are the methods most often used.

A typical blending system is illustrated in Fig. 1. Gasoline is recirculated through a "circulating pump" back to the blending tank. An "eductor pump" takes suction off of this line and pumps to an "eductor" which sucks TEL from a weigh tank or drum. This mixture of TEL and gasoline is then discharged back into the recirculating line and mixes with the remainder of the gasoline stream. After the desired amount of TEL is added, the eductor pump is shut down and the tank is agitated until it is uniformly mixed.

Recirculation system . . . In the recirculation system, gasoline is circulated through a pump back into the tank through spider arrangements, swing lines, or other means. For these systems, a rule of thumb is that mixing is complete after the tank has been turned over one time through the pump.

This system is simple and, other than the normal installation of pumps and pipelines for filling and emptying the tank, the only installation needed is the swing line or spider arrangement. However, the power costs for this system are high as the pump is in use for a long period. High-capacity pumps must be used for large blending tanks in order to turn the tank over in a reasonable length of time, and the circulating pump, pipelines, and blending tanks are tied up for long periods and not available for other purposes.

In-tank propeller mixer system . . . An improved mixing system is that of in-tank propeller mixers. In this system, the tank contents are agitated by propellers, and a circulation system, similar to Fig. 1, is used for TEL addition. The recirculation stream is introduced above one of the propellers and is dispersed by it. After the TEL addition is completed, the tank is usually agitated for a period of 1 to 8 hours, depending on the size of the tank and the size and number of the mixers installed, to uniformly blend the contents.

This system features reduced power costs as compared to the recirculation system; pipelines and pumps are in use for shorter periods and are thus available for other uses; mixing times for the tanks are shorter, increasing tank utilization; and the required capacity of the circulating pump is much lower. However, the cost of the necessary equipment and its installation is comparatively high, and savings from the aforementioned advantages must justify the increased investment.

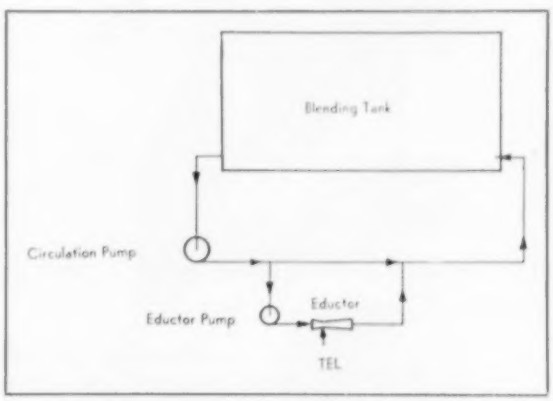


Fig. 1—Normal blending circulation system.

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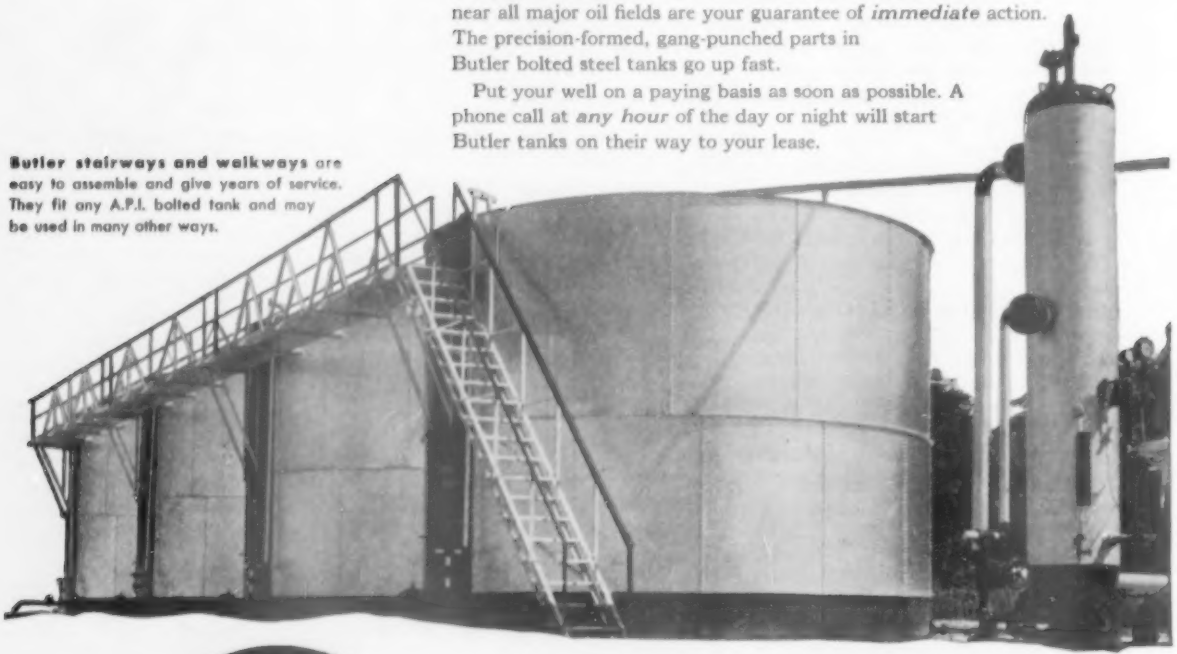

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by **W. L. Nelson**
Technical Editor

QUESTIONS ON TECHNOLOGY

Consumption of Fuel by Refiners

"Can you please supply information on the following losses of crude oil: (1) gas loss at time of production, (2) lease losses, (3) transportation to refinery, (4) refinery losses, (5) used as refinery fuel, and (6) handling and distribution to consumer?" T.A.M.

It is probably impossible to provide even approximate figures for most of the above losses. The only dependable information that is readily available is the heat required for petroleum refining. According to the U. S. Bureau of Mines (Pet. Facts and Figures of Am. Pet. Inst., 1950), the number of B.t.u. consumed per barrel in 1948 was 632,000 which is larger than in 1939 (555,000 B.t.u.) but much less than the 1925 figure of 829,000 B.t.u. Even such figures cannot logically be converted into percentages of loss because an increase in volume occurs in some refinery processes, especially thermal or catalytic cracking, and because small amounts of acid sludge, natural gas, coal and coke are used as fuels as well as refinery gases and fuel oil. However, the 632,000 B.t.u. is the equivalent of about 10.9 per cent of the crude oil.

In actuality, refinery losses in terms of liquid volume per cent of the crude oil processed may be as low as 0.31 per cent *(Resen, F. L., How to Reduce Losses in a Refinery, The Oil and Gas Journal, July 21, 1952, p. 65)* but is more often in the range of 2-3 per cent (Here's How Michigan Refiner Cut Operating Losses, *(The Oil and Gas Journal, February 9, 1953, p. 112)*, and may be as high as 4 per cent.

A survey by the U. S. Bureau of Mines for 1920-1921 (Schmidt, L., U. S. Bur. Mines Bulletin 379, completed Aug. 1933 but published 1937) shows the Mid-Continent field losses indicated below, and an interpretation for the year 1933 has been added as a second column:

	1920-21% Evaporation	Estimated for 1933
Flow tank	1.0	1.0
Filling lease tank	1.0	
Lease storage	1.5	
Gathering systems	1.0	0.6
Transportation	1.0	0.6
Tank forms	0.7	0.4
	6.2	2.6

Even smaller losses occur today although crude oils are more volatile today than in 1921.

Apjohn and Heath (Problems in the Efficient Utilization of Refinery Butanes in Motor Gasoline, thirteenth midyear meeting, A.P.I. Refining Division, Philadelphia, May 13, 1948) have thoroughly investigated the losses of gasoline or butanes in being delivered from the refinery to the customer (see Table 1). The losses indicated in Table 1 are for the following extensive handling:

1. Refinery and terminal storage on Gulf Coast.
2. Tanker shipment to East Coast terminal storage.
3. Storage and shipment by barge to bulk plant.
4. Truck to service station underground storage.

The butane that is added to gasoline to obtain a proper vapor pressure is the most volatile component and it constitutes a large proportion of the material that is lost.

TABLE 1—PER CENT (REPRESENTATIVE) LOSS OF GASOLINE*

Season	R.v.p.	Refinery to service station tank	Refinery to automobile tank	Refinery through carburetor of a car
Summer	8	1.18	1.78	2.04
	10	1.73	2.74	3.99
Intermediate	10	1.11	1.68	2.21
	12	1.46	2.27	3.80
Winter	12	0.69	0.93	1.03
	14	0.80	1.09	2.18

*From storage tank on Gulf Coast via tanker to East Coast, then by barge to bulk plant and finally by truck to filling station.

How Operating Costs Have Changed

"In your answer of July 13, 1950, you suggested a way to obtain operating costs during various years. Have you a complete tabulation of such operating costs?"—Wm. P. G.

The operating index suggested in the Questions on Technology of July 13, 1950, has been computed for the years 1931-1953 as shown in Table 1. The only questionable thing about the index is the amount of tetraethyl lead used each year. This item had to be estimated for recent years (1952-1954).

The operating index is based on variations in the cost of operating labor, changes in price of No. 6 fuel oil ($1.25 per barrel for gulf cargoes during 1946, the base year), changes in maintenance costs (Nelson Refinery Construction Cost, each month in The Oil and Gas Journal), and the cost and amount of TEL. Variations in the price of No. 6 fuel oil have a very large effect on refinery operation costs; note the very high cost for 1948 and the relatively low cost for 1949.

TABLE 1

Approximate Relative Costs of Refinery Operations, 1931-1953, Based on 1946 as 100

1931	49	(43.7-54.6)
1932	43	(38.8-47.2)
1933	49	(44.7-53.1)
1934	61	(55.7-65.7)
1935	57	(53.0-61.3)
1936	62	(57.3-66.6)
1937	70.5	(67.9-73.1)
1938	63	(59.0-66.9)
1939	67	(62.7-70.6)
1940	69.5	(65.7-73.3)
1941	71.5	(68.6-74.4)
1942	74	(71.2-76.4)
1943	81.5	(78.0-84.8)
1944	82.5	(78.8-85.8)
1945	82.5	(80.0-84.8)
1946	100.0	
1947	137.5	(136.6-138.5)
1948	176	(175.0-177.0)
1949	140.5	(131.9-149.0)
1950	152.5	(142.1-162.7)
1951	160.5	(150.9-170.1)
1952	161.5	(151.8-171.4)
1953	163.0	(156.1-169.8)
May 1954	168.0	(164.3-171.4)

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Among the Drilling Contractors

Five Rowley Rigs Busy In Southeastern States

H. L. Rowley, Inc., Shreveport, reports operations under way at five deep contract jobs in South Louisiana, Mississippi, and Florida. All except one are wildcats.

South Louisiana jobs include a 10,800-ft. test for Natural Gas & Oil Corp. at 1 Kimball, in 50-8s-9e, 4 miles south of Rosedale area, in Iberville Parish, with John Howard as tool pusher; a 12,500-ft. test for Southern Natural Gas Co. at 1 St. Martin, in 28-8s-7e, south of Plumb Bob field, in St. Martin Parish, with Herman Son as tool pusher; and a 10,000-ft. Tuscaloosa well for LaGrange Petroleum Corp. and Republic Natural Gas Co. in Big Island field, Rapides Parish, with George Roberts as tool pusher.

The Iberville Parish wildcat has drilled to 8,547 ft., where casing has been run and testing of oil and gas showings started.

In Mississippi, drilling is getting under way on a 10,200-ft. test for Sun Oil Co. Location is near Pearlington, in Hancock County, in the extreme southern part of the state, less than a mile from the Louisiana line. Leland Bundy is tool pusher.

The Florida operation is for Sinclair Oil & Gas Co. at 1 Bauer, in 5-3s-31w, 7 miles west of Pensacola, in Escambia County. This is the third of a series of Florida wildcats being drilled for the latter operator. Lamar Windham is tool pusher.

Allison Drilling Co. has contract for a 7,800-ft. Lyons (Permian) test in the Timnath area of Larimer County, Colorado. It is J. Ray McDermott, B. F. Allison and T. W. and J. M. Loffland, Jr., 1 Hummel, C NE SW 3-6n-68w, 5 miles southeast of Fort Collins.

Deckard Drilling Co. is keeping a rig busy in the new development between East and West Heidelberg fields, in Jasper County, Mississippi, where it is drilling for R. Merrill Harris, of Jackson. Its latest operation is at 3 Masonite, a 5,300-ft. Eutaw well, in 36-1n-12e.

Miller & York are handling the contract for Elliott, Classen & Mickle 58 S.F.&F.L. Co. in 12-25-19, on the northwest of Lost Hills field, California.

Calvert Drilling Co. has contract for a wildcat in Wells County, North Dakota, 11 miles southwest of Fessenden. It is Carolina Hunt Trust Estate 1 Archie Johnson, NE NE 31-147n-71w. **Tenison Drilling Co.** has contract for a wildcat in Dickey County, North Da-

Jones, Shelburne & Farmer, Inc., Oklahoma City and Russell, Kans., drilling contracting and oil-producing firm, has just completed the ninety-ninth producing well in Norton field, Norton County, Kansas. Shown at the rig after running the oil string are: (Top row, left to right) Vollmer Keller, district manager, Bomud Co., Plainville, Kans.; Jim Corbin, welder; Virgil Dreiling, driller; Jack Pulec, derrickman; Nick Dreiling, motorman; Paul Wagner, floorman; and (front row, same order) Donald Blair, Bomud Co.; Dale Buchheister, tool pusher; H. D. Mason, driller; Norman Mason, derrickman; J. H. Stevens, motorman; and Darrel Berry, floorman.

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kota, at Snowden-Sheehan 1 Gibson, SE SE 34-130n-63w, 6 miles southwest of Ellendale.

Tuley & Carter are contractors for a wildcat in Banner County, western Nebraska, in the Denver-Julesburg basin. The test is Al Ward & Son 1 Hottel, SE SW SE 6-18n-57w, 12 miles west of Harrisburg, Neb.

Clinch Drilling Co., Jackson, Miss., has a new contract operation under way at an outpost location east of Idlewilde field, in Jefferson County, Mississippi. Drilling is for Thomas J. Glennon, of Natchez. The test is listed as 1 Pikering, with location in 19-9n-1w. The deal gives the contractor an interest in the operation.

H. H. Simons Drilling Co. is contractor on a projected 2,500-ft. wildcat test Leonard Latch is undertaking in northwestern Collingsworth County, Texas Panhandle. Location, 1 Tollett, in Section 2, Block 22, H&GN Survey, is 20 miles northwest of Wellington, and 9 miles south of Permian gas production on the southeast flank of Panhandle field.

Tackett & Tackett tools are under contract for a rank wildcat test 7½ miles west of Mena, in Polk County, western Arkansas. The test, to be drilled for James F. Whitehorn, of Dallas, is 1 Scoggin, in 12-2s-32w. Location is 5 miles east of Oklahoma's Leflore County line. Projected depth is 3,000 ft.

Gabe Howell has a contract with Spencer Chemical Co., of Kansas City, for a 4,000-ft. test 3½ miles southeast of Greenwood, in Sebastian County, western Arkansas. The test, 1 Spencer, in 29-6n-30w, is a rank wildcat.

Butler-Johnson Service Corp., Shreveport, is drilling for Shell Oil Co. at a new wildcat operation near Como, 6¾ miles southeast of Winnsboro, in Franklin Parish, northeastern Louisiana. The test, 1 Snider et al., in 12-13n-8e, is projected to the Lower Cretaceous section around 7,500 ft. Location is 3¼ miles north of the discovery well on Gilbert salt dome.

Fortenbery Drilling Co., Natchez, Miss., has a new 6,000-ft. Wilcox test under way for Calto Oil Co., of Dallas, at an outpost location about ¾ mile southwest of production in the Horseshoe area, Concordia Parish, eastern Louisiana. Designation of the test is 1 State-King, with location in 12-6n-7e.

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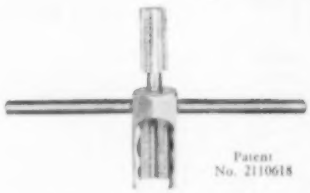

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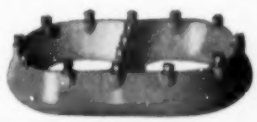

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Quaker State finishes first of three Platforming units

FARMER'S VALLEY, Pa.—Quaker State Oil Refining Corp. has put the largest of three Platformers it will operate this fall on stream at its refinery here.

The 1,500-bbl. unit is designed for the production of motor fuel and is the first Platformer in the eastern part of the United States which is operating on full-boiling-range straight-run gasoline. The Universal Oil Products-licensed reformer is processing a Pennsylvania straight-run gasoline low in naphthene content, and is producing a 96 leaded octane number Platformate which is then used as a blending compound in Quaker's gasoline.

Procon, Inc., built the unit, which is equipped with recycle gas scrubbing facilities to remove hydrogen sulfide.

Procon is building two other Platformers for Quaker at its Emlenton, Pa., and St. Mary's W. Va., refineries.

Deaerator Manual Ready

NEW YORK.—The Heat Exchange Institute has issued its third edition of "Standards and Typical Specifications for Deaerators and Deaerating Heaters." In contrast to the two previous editions published in 1940 and 1945, the new book has rearranged and revised all material.

Included is a new table giving storage in minutes and cubic feet for tabulated capacity from 10,000 to 1,600,000 lb. per hour. The tables of shell and head thicknesses have been revised and expanded as has the table on accessories selection and standard opening sizes.

Object of the manual is to aid purchasers by defining terms and establishing standards of capacity, performance, and construction of this type of equipment. Copies are available from Heat Exchange Institute, 122 East 42nd St., New York 17, N. Y., at a cost of $1 each.

N.P.A. to Discuss New Motor Oils at Annual Meeting

ATLANTIC CITY, N. J.—National Petroleum Association will try to settle some controversal questions surrounding multiple-graded motor oils at its fifty-second annual meeting here September 15.

A technical symposium will take up the problem on the second day of the 3-day meeting. A panel composed of six experts from the oil and automotive industries will give opinions on: Do multiple-graded motor oils save gasoline? Do they reduce deposits? Do they protect the engine?

The six-man panel will be made up of R. K. Williams of Research Laboratory Division of General Motors; C. W. Georgi, Quaker State Refining Corp.; R. Overcash and W. Hart, Kendall Refining Co., and L. Raymond and L. F. Socolofsky, Socony-Vacuum Oil Co., Inc.

NELSON REFINERY CONSTRUCTION INDEX

Appears on the Refining page in the first issue each month.
Compiled by W. L. Nelson—Petroleum Refinery Consultant—Tulsa.
The Index was explained July 7, 1952 (p. 105) as well as the Indexes of Individual Items of Equipment that appear on the Cost-imating page in the first issues of the months of January, April, July, and October.

INDEX (1946 = 100)

	1948	1950	1951	1952	1953	May 1954
Pumps, compressors, etc.	127.0	138.2	155.9	155.6	162.5	166.7
Electrical machinery	127.6	134.9	154.3	152.4	156.4	159.6
Internal combustion engines	116.9	126.0	146.1	146.5	148.1	150.6
Instruments	120.0	127.8	142.3	146.2	151.8	153.9
Heat exchangers	130.0	140.0	152.0	165.8	174.9	175.9
Miscellaneous equipment average	122.1*	126.2*	145.1*	153.3	158.8	161.3
Materials component	139.3	149.5	164.0	164.3	172.4	173.6
Labor component	128.0	144.0	152.5	163.1	174.2	181.5
Refinery Construction Index	132.5	146.2	157.2	163.6	173.5	178.4

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the miscellaneous equipment items shown above.

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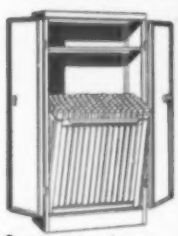

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High Gas-Oil Yield Claimed

TYLER, Tex.—A gas-oil yield of 90 per cent of the residuum charge is being obtained from the industry's first decarbonizer, now in operation at McMurrey Refining Co.'s refinery here, according to Blaw-Knox Co., which designed and built the unit.

The unit, in operation for several months, processes 8,000 bbl. per stream day of East Texas residuum and produces 7,200 bbl. of gas oil having a Conradson carbon of less than 0.15 weight per cent. The unit also produces 60 tons per day of coke, according to Blaw-Knox.

The unit is similar to a delayed coking unit but operates at a lower pressure. According to Blaw-Knox, coke yield is about 50 per cent lower and the gas-oil yield is about 25 per cent higher than that of a conventional delayed coking unit.

Refinery Will Close

GARDEN CITY, Kans. — Shallow Water Refining Co. has told the Kansas Conservation Commission that it will close its 4,000-bbl. refinery here sometime in September.

The refinery has been specializing in heavier road oils and running at only a little above one-half of capacity. Increased operating expenses and declining revenue were given as the main reason for the shutdown.

Petrochemicals

Unit Approved

Sinclair will build Udex unit at Marcus Hook plant

NEW YORK.—Sinclair Chemicals, Inc. has followed through with previously announced plans by commencing construction of a new petrochemical plant at the Marcus Hook refinery of affiliated Sinclair Refining Co. The plant will be a 2,300-bbl. per day Udex unit licensed by Universal Oil Products Co.

The Udex unit will process a selected reformate from Sinclair's 16,000-bbl. per day Sinclair-Baker catalytic reforming unit now building. A total production of 18,000,000 gal. per year, or 1,170 bbl. per day, of toluene, paraxylene and xylenes will be produced for end uses in manufacture of plastics, synthetic fibers, paints, medicinals, and other chemical products. Paraxylene capacity will amount to about 10,000,000 lb. per year, or 3,780 gal. per day.

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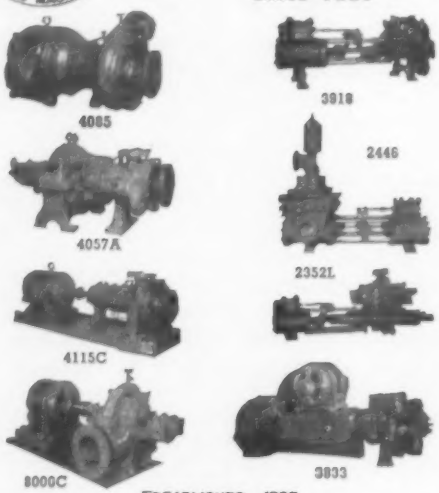

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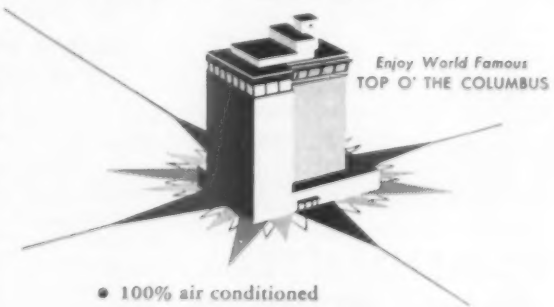

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Pipeline Patrol

. . . Report on Construction

Wet Work on Trans Mountain Project

ALTHOUGH the terrain looks like Louisiana swampland, in reality it is located near the Nooksack River in Washington State where Hood Construction Co. is now completing river-crossing work on the 20 and 16-in. crude line for Trans Mountain Oil Pipe Line Corp. The line will run from near Sumas, B. C., to the Ferndale, Wash., refinery of General Petroleum Corp. and will provide a needed outlet for crude carried over the Canadian Rockies from Edmonton, Alta., through Trans Mountain's 24-in. line.

This view shows a short section of the line being pushed into place for a small stream crossing in the bottom lands of the Nooksack River.

Under Way, Contracted, and Planned . . .

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

Arapahoe Pipe Line Co.—This company owned jointly by Sinclair and Pure has let contracts on a 494-mile crude line from Merino, Colo., to Humboldt, Kans. The contracts were let in the following sections:

Section 1.—149 miles of 18-in. from Merino to Colby, Kans., R. H. Fulton & Co.

Section 2.—162 miles of 18-in. from Colby to Schurr Station, Kans., R. H. Fulton.

Section 3.—84 miles of 20-in. from Schurr Station to Burns, Kans., R. H. Fulton.

Section 4.—86 miles of 20-in. from Burns to Humboldt, Panama Williams Co.

Armex Pipe Line Co.—Company has applications for two lines before the Office of Defense Mobilization Board for rapid amortization approval.

1. A crude oil line from Albuquerque, N. M., to Phoenix, Ariz. This line would serve a 20,000-bbl. refinery being planned by Frost & Associates of Dallas.

2. A crude oil line from Guernsey, Wyo., to Albuquerque.

• **California-Oregon Pipe Line System.**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

Minnesota Pipe Line Co.—Williams Brothers Co. has contract to build this 260-mile, 16-in. crude line from Clearbrook to Hastings, Minn. The line, to cost $12,500,000 is the southern end of a system which will move crude from Fosterton field, Sask., to Great Northern's refinery which is building in the Minneapolis-St. Paul area. Present plans call for completion by July 1955.

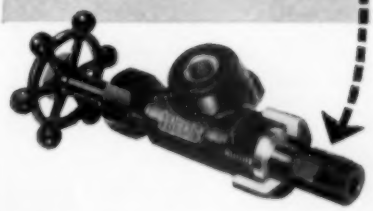
• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. cost: $3,500,000.

• **Orchard Pipe Line Co.**—45 miles, 8-in.,

PENBERTHY GAGE VALVES WITH

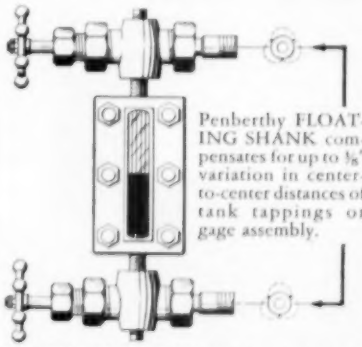
FLOATING SHANK

SAVE TIME and TROUBLE



Take a look at the tail pipe of the valve pictured here. Notice that it is adjustable in relation to the body of the valve.

This "floating" feature adds flexibility in mounting. It compensates for inaccurate center-to-center gage assemblies or variations in tank tappings... up to 1/8". Since a normal gage and valve assembly involves four threaded connections, the time saved in installing is appreciable. In addition, mounting stresses are eliminated.



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Pipeline Patrol

proposed to transport crude from Masters field in Logan County, Colorado, to Merino, Colo. Estimated cost: $811,250.

Shell Pipe Line Corp.—Houston Contracting Co. has contract to build 72 miles of 8-in. line from Halletsville to Brookshire, Tex. Job includes crossings of Brazos and Colorado rivers. H. J. Muckley is superintendent, H. L. Leake is spread superintendent. Work 75 per cent done as of August 20.

Standard Pipe Line Co.—Company plans to build two crude lines. Applications are now before the Office of Defense Mobilization for rapid amortization approval.

1. A 350-mile, 16-in. crude line from Glendive, Mont., to Guernsey, Wyo., to connect with Platte Pipe Line Co.'s system there.

2. A 330-mile, 16-in. crude line from Wink, Tex., to Albuquerque, N. M. This line would serve a 10,000-bbl. refinery being planned by Frost & Associates of Dallas.

Trans Mountain Oil Pipe Line Co.—Company has awarded contract to Engineers Limited Pipeline Co. to build 15 miles of 20-in. and 11 miles of 16-in. line. Both lines run from Sumas, B. C., to General Petroleum's refinery which is being built at Ferndale, Wash. Completion set for September 1954.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. Size not yet determined. Engineering work under way.

Western Pipe Line Co.—This subsidiary of Service Pipe Line Co. has let contracts for 630 miles of 20, 22, and 24-in. crude line from Fort Laramie, Wyo., to Freeman, Mo. The western section of the line will be laid by H. B. Zachry Co. and the eastern section will be constructed by O. R. Burden Construction Corp.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

Badger Pipe Line Co.—Company to build 195 miles of 8-10-12-in. pipeline from East Chicago, Ind., to Madison, Wis. One section of 40 miles has been let to Morrison Construction Co. of Hammond, Ind.

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Great Lakes Pipe Line Co.—Company began a 714-mile expansion program at the beginning of Spring. First section of the program, 182-mile, 8-in., from Nebraska City to Doniphan, Neb., is finished. The remainder of the work is divided as follows:

127 miles, 8-in. from Iowa City, Iowa, to Prophetstown, Ill., to tie in with the Badger system there. M. R. Co. and Mid-States Construction Co. have the job.

188 miles of 12-in. from Kansas City to Des Moines. Midwestern Constructors, Inc., has 48 miles, R. H. Fulton & Co. 71 miles, and M. R. Co. has 69 miles.

83 miles of 12-in. between Alexandria and Rosendale, Minn., being done by Associated Pipe Line Contractors, Inc.

80 miles of 12-in. between Rosendale and Rosemount, Minn., being done by R. H. Fulton & Co.

105 miles of 8-in. from Alexandria to Fargo, N. D., being done by R. H. Fulton & Co.

Harbor Products System.—86 miles of 16-in. under way from Woodbury Junction to Tremley Point, N. J. Pipeline Construction & Drilling Co. is doing the work and completion is not definite because of right-of-way difficulties.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost: $4,200,000.

Moore Stoner Co.—Company has $2,500,000 tax amortization for a 200-mile, 6-in. products line from a connection with Oil Basin Pipe Line Co.'s terminal at Glendive, Mont., to Minot, N. D.

Oil Basin Pipe Line Co.—Midwestern Constructors, Inc., doing the work on this 230 miles of 8-in. products line from Laurel to Glendive, Mont. Tentative completion date set for September 15. Cost: $5,350,000.

Shel Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt. Job held up indefinitely by right-of-way difficulties.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport LPG from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

U.S. Gov't. Alaskan Products Pipe Line.—600 miles, 8-in., under way, Haines northward through British Columbia and Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Maxwell Const. Co. Completion date 9-55.

Wyoming-Nebraska Pipeline Co.—Houston Contracting Co. has general contract to build 220 miles of 6-in. line from Frontier Oil Co.'s refinery at Cheyenne to North Platte, Nebr. Work expected to be completed by October 1954.

Yellowstone Pipe Line Co.—(Continental Oil Co., Interstate Oil Pipe Line Co., Union Oil Co., and H. Earl Clack interest) 531 miles, 10-in., under way, Billings, Mont., to Spokane, Wash. Completed. Estimated cost: $20,500,000.

Billings to Bozeman, Mont. Ross and Powers.

Bozeman to Helena and on to Clinton, Mont. Associated Pipe Line Contractors, Inc.

Helena to Clinton, Mont. Associated Pipe Line Contractors, Inc.

Clinton to Perma, Mont. Eastern Pipe Line Field Service Co.

Perma, Moat., to Murray, Idaho. Eastern Pipe Line Field Service Co.

Murray, Idaho to Spokane, Wash. Engrs. Limited Pipe Line Co.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Louisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000.

• **Arkansas Louisiana Gas Co.**—136 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166. FPC approved.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, later lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **Cities Service Gas Co.**—24 miles of 26-in., planned, to replace two existing 16-in. lines in Franklin and Johnson counties, Kansas. F.P.C. approved.

Nine miles of 20-in. to replace existing 16-in. line in Cherokee and Jasper counties, Missouri. F.P.C. approved.

Pipeline Patrol

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., F.P.C. approved, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

• **Coast Counties Gas & Electric Co.**—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., approved by F.P.C., Green River, Wyo., to Denver, Colo., 1954.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose, Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

Gulf Interstate Gas Co.—Company is winding up 860-mile, 30-in. job from Acadia Parish, Louisiana, to Boyd County, Kentucky.

• **Home Gas Co.**—Asking for bids on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Also asking for bids on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County line, West Virginia. Estimated cost: $930,000.

• **Houston Texas Gas & Oil Co.**—Company proposes to build three natural gas lines. One line would run from lower Rio Grande Valley to Chicago. The other line would go from southern Louisiana to New York City. Third line would run from Louisiana to Florida., 20, 24, 30-in., pipe considered in plans. Engineering firm reported preparing an economic report on the lines at present.

• **Iroquois Gas Corp. and Tennessee Gas Transmission Co.**—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Iroquois Gas Corp.**—25 miles of 20-in. line, approved by FPC, from Iroquois' Porterville station near Elma, N. Y., to Tonawanda, N. Y. Est. cost: $1,540,000.

• **Kansas-Nebraska Natural Gas Co., Inc.** Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., proposed, Doddridge, Wetzel and Marshall counties, West Virginia.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

Mid-South Gas Co.—Engineering Construction Co. of Tulsa has contract for 50 miles of various size pipe from Marion to Truman, Ark.

• **Missouri Central Gas Co.**—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virgina, to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co., and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Midwestern Constructors has finished one job for this company consisting of 5 loops of 94.3 miles of 30-in. line in Texas, Oklahoma, and Kansas.

93½ miles of 20-in. from Ogden to Waterloo, Iowa, being done by Hallmac Construction Co. of Houston.

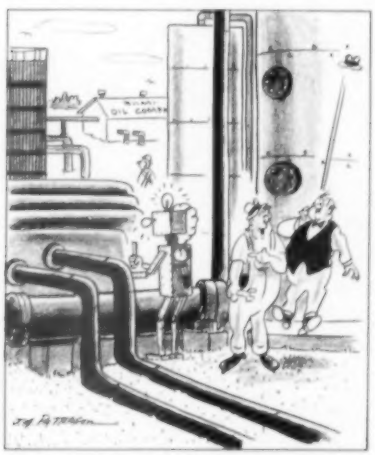
90 miles of 16-in. from Waterloo to Dubuque, Iowa, being done by Engineering Construction Co. of Tulsa.

54 miles of 16 and 10-in. from Newton to Grinnell, Iowa, has been finished by G. G. Griffis Const. Co. of Tulsa.

24 and 26-in. lines south of Paullina, Iowa, and 20 and 24-in. lines from Paullina to Sioux City being done by R. H. Fulton Co.

Two underwater crossings totalling 5,100 ft. being done by Lone Star Constructors of Dallas.

G. G. Griffis also has 118 miles of 2-12-in. between Rochester and Redwing, Minn., for Northern Natural.



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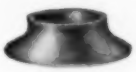

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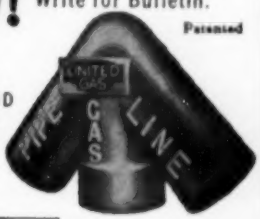

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PIPE LINE SURVEYS

Pipeline Patrol

• **Northwest Alabama Gas District.**—40 miles, 9-in., proposed, Southern Natural's line through Winfield to Haleyville, Ala.

• **Ohio Fuel Gas Co.**—31 miles, 20-in., planned, Licking County to Richland County, Ohio.

22 miles, 16-in., planned, Dayton, Troy, Piqua, and Sidney, Ohio.

23 miles, 16-20-in., planned, Wellington to Elyria, Ohio; 16 miles, 20-in., planned, Benton Station to Crawford Station; 18 miles, 20-in., Crawford Station to near Columbus; 16 miles, 16-in., planned, Berlin to Sandusky, Ohio.

74 miles, 3 to 20-in., planned, Hocking, Knox., and Ashland counties, Ohio.

47 miles, 20-in., planned, Benton Township, Hocking County, to Columbus, Ohio.

61 miles, planned, northern and southwestern Ohio.

33 miles, 20-in., proposed, Jefferson to Seneca, Ohio.

69 miles, 20-24-in., proposed, lines to tiein Gulf Interstate line along various points in Lawrence, Jackson, Vinton, Hocking, and Fairfield counties, Ohio.

• 24½ miles of 20-in. line in Richland and Crawford counties, Ohio.

Pacific Gas & Electric Co.—200 miles, 34-in,. planned, paralleling Topock-Milpitas lines. 93 miles completed. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif. Completion November 1954.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash. Approved by FPC.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

• **Pine Tree Natural Gas Co.**—204 miles of underground size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. cost: $9,000,000. FPC approved.

• **Southwest Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

Tennessee Gas Transmission Co.—Company has awarded following contracts on 566.8 miles of 30-in. line from Kinder, La., to Portland, Tenn.

98.7 miles from Kinder to U. S. Highway 84 near Jena, La., to Morrison Constructors, Inc.

90.2 miles from U. S. Highway 84 to Louisiana side of Mississippi River to Anderson Brothers Corp.

105 miles from Mississippi River to U. S. Highway 51 near Grenada, Miss., to Houston Contracting Co.

101.6 miles from Grenada to U. S. Highway 45 near Corinth, Miss., to Oklahoma Pipe Line Constructors.

94.9 miles from U. S. Highway 45 to near Centerville, Tenn., to Western Pipe Line Constructors, Inc.

75.6 miles from Centerville to near Portland, Tenn., to Panama-Williams Co.

63 miles, 26-in., under way, loops in Ohio and Pennsylvania. H. C. Price Co.

45 miles, 20-in., proposed, Buffalo, N. Y., to the U. S.-Canadian border near St. Catherines.

243 miles 24-in., planned, Coudersport, Pa., eastward across Pennnsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Transmission Corp.**—Proposed 382-mile, 30-in. line from Kosciusko, Miss. to Beaumont, to connect with the existing 30-in. line there to Connellsville and replace the "Little Inch" in moving natural gas.

• Company proposes to build 58 miles of 20 and 16-in. pipeline from Joaquin to Longview, Tex. Company has filed an application with the Federal Power Commission. Cost: $3,269,000.

Texas Eastern Penn-Jersey Transmission Corp.—265 miles, 24-in., approved by the FPC from Oakford Storage field in western Pennsylvania to Texas Eastern Transmission Corp.'s Compressor Station No. 26 near Lambertville, N. J. Est. cost: $30,755,000. 54 miles let to H. C. Price Co. C. E. Shivel, superintendent.

• **Texas Gas Transmission Corp.**—48 miles, 26-in., planned, loops from Memphis to Slaughters, Ky.

24 miles, 16-in. line planned from North Tepetate field, Acadia Parish, Louisiana, to South Roanoke field in Jefferson Davis Parish, Louisiana. Work to be done in September and October.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line.

• 19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• 57 miles of 36 and 30-in. paralleling sections of its existing system in Louisiana, Mississippi, and Alabama. Approved by FPC. Est. cost: $6,533,000.

• 25 miles of 12-in. in Cameron and Calcasieu parishes, Louisiana, to additional gas reserves. Est. cost: $1,000,000.

• **Trunkline Gas Co.**—Proposes to cross the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000.

57 miles, 30-in., under way, Lanham in Kanawha County, West Virginia, to Gulf Interstate line in Boyd County, Kentucky. C. R. Ice, spreadman.

"—ssh, Mac, I wouldn't press my luck."

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Foreign Crude-Oil Pipelines

• **Atlas-Dresser.**—Included in this company's agreement with the Argentine Government are plans to built a 400-mile, 16-in. crude line from Plaza Huincul area to Bahia Blanca.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Sabaqueous work. Shutdown for Monsoon season. Work will resume September 15.

Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

South Saskatchewan Pipe Lines, Ltd.—Fulton-Banister, Ltd. has contract to construct 150 miles of 16-in. crude line from Fosterton field in Saskatchewan to a connection with Interprovincial Pipe Line Co.'s system at Regina. Line will have a capacity of 20,000-bbl. per day, will cost $10,000,000 and is expected to be finished by November.

• **Pembina Pipe Line Co., Ltd.**—Company building 325 miles of 3-12-in. gathering line from Pembina field and a 72-mile, 16-in. transmission line to the terminals of Trans Mountain Pipe Line Co., and Interprovincial Pipe Line Co. at Edmonton, Alta.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

• **Petroleos Mexicanos.**—145 miles, 12-in., under way, Jose Colomo to El Plan, Mexico.

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petrolíferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Foreign Products Pipelines

Anglo-Iranian Oil Co., Ltd.—18½ miles 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden,. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

Pipeline Patrol

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO).—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line). Contracted by Soc. Foster Wheeler Francaise.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States Navy Department.**—Proposed 300-500-mile line to be built in Spain to serve a proposed naval base and four large air bases which are also proposed under a defense agreement with the Spanish Government. No definite size or cost is known now.

Foreign Natural-Gas Pipelines

Alberta Gas Trunk Line, Ltd.—This Canadian firm has let engineering c ontracts to two firms, Dutton, Williams Brothers, Ltd., and Mannix, Ltd. for a 300-mile, big inch gas-gathering system to collect Alberta's natural gas for transportation to Trans Canada Pipe Line Co.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, contractor.

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Sui Gas Transmission Co., Ltd.—Morrison-Knudsen Construction Co. has contract to build 350-mile, 16-in. line from Sui field to Karachi in West Pakistan. Est. cost: $25,000,000.

• **Trans-Canada Pipe Lines, Ltd., Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

• **Union Gas Co. of Canada, Ltd.**—Proposed line from Lambton County gas-storage fields to Oakville. Line is being proposed now and will eventually join with proposed line from Alberta to Toronto and Montreal.

• **U. S. Navy.**—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

• **Western Pipe Lines, Ltd.**—Will build 80-mile, 20-in. line from Niagara Falls, N. Y., to Toronto. Gas will be furnished by Tennessee Gas Transmission and taken over in Toronto by Consumers Gas Co. Est. cost: $7,000,000. Canadian Bechtel, Ltd., doing engineering work.

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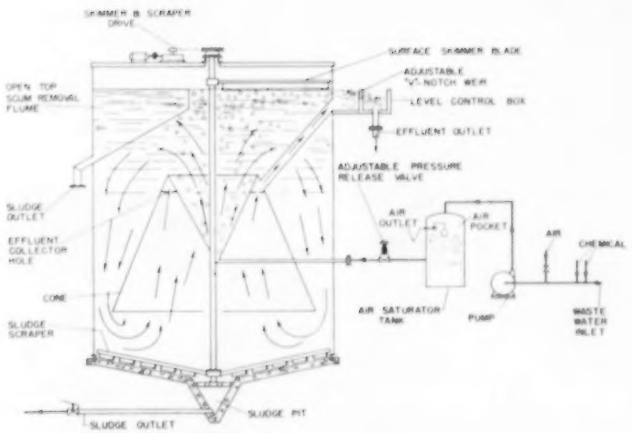

Aeroflotor Removes Top and Bottom Particles

Graver Aeroflotor, a new flotation unit, has many process applications in the petroleum and chemical fields. Besides handling floatable particles, the unit is capable, when necessary, of also removing settleable particles at the same time in the same unit. Since both types of particles are removed continuously, the unit can be especially advantageous where both heavy and light density are to be removed from the same liquid.

The influent is aerated under pressure in the air-saturator tank to dissolve air in the stream before entering the flotation machine. Upon pressure release, the dissolved air will come out of the solution in the form of tiny bubbles, the size of which depend upon the aeration pressure or pressure drop at the release point and the amount of air in solution.

After entering the flotation machine, the particles physically adhere to the tiny bubbles, increasing their relative density, and rise to the top. After floating to the surface, the "float" dewaters partly and is moved to a collector trough for removal. The concentration of the "float" can be varied by changing the holding time on the surface before skimming. This is accomplished by adjusting the operating level so as to regulate the quantity being skimmed off by the rotary skimmer.

When it is necessary to also remove settleable solids, the Aeroflotor is equipped with a bottom scraper. Heavy particles settle to the bottom as the water passes downwards through the separator cone and are scraped to a central-collector sludge pit. *Graver Water Conditioning Co.*

Check No. 1 On The Time-Saver Card

●

Gate Valve Incorporates Improved Design Features

Longer-wearing wedges, stronger stem-to-wedge connections, and a union bonnet giving increased efficiency are incorporated into these newly designed forged-steel gate valves made by Ohio Injector Co.

The wedges are made of 13 per cent chrome-stainless steel for corrosion resistance and are duracased, to at least 1,000 Brinell hardness, to prevent galling and excessive wear caused by closure upon abrasive particles in the flow. The stem-to-wedge connection increases pull-out strength to many times the theoretical requirement.

The design distributes the pull-out load more efficiently throughout the wedge structure to meet the most stringent specifications of valve buyers. In the union-bonnet construction, a body-to-bonnet joint of male-female type provides a recess for the gasket, seating it accurately and more securely, thereby reducing the possibility of leakage and blown gaskets. *The Ohio Injector Co.*

Check No. 2 On The Time-Saver Card

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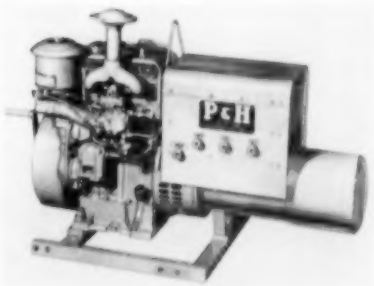

Gasoline-Engine Welder Is for Shop and Field Use

The new lightweight gasoline-engine welder Model WN-150 combines extremely small, compact size with generous output. Power is supplied by a two-cylinder, air-cooled gasoline engine close coupled to the P&H-built welding generator. Control has been simplified by the use of plug-in stations and by a variable-speed engine which covers the full heat range. Capacity is 20 to 200 amp. Weight of the Model WN-150 is 425 lb. and dimensions are 45 in. over-all, 20 in. in height. It is available with two-wheel mounting. It is designed to give an all-purpose welding service in the shop and in the field at a very minimum of welder investment. *Harnischfeger Corp.*

Check No. 3 On The Time-Saver Card

●

What's New... Use the handy Time-Saver Cards

New Plug Valve Assures Positive Seal

A new nonlubricating, self-sealing plug valve uses two especially designed, synthetic-rubber cups, slightly recessed in the plug, to make positive seals on both the upstream and downstream ports. These positive seals make it possible to install the bleeder in the body of the valve, thus eliminating the usual practice of using two valves together with a tell-tale bleed. The synthetic-rubber-cup seals are constructed so that the entire pressure is positively contained within the cup area.

Sealing action of the valve is absolutely positive and product deliveries may be made against it without fear of contamination. All the weight is carried on the top and bottom plug bearings. The plug does not touch the body. On larger sizes, 6 in. and up, antifriction bearings are used for ease of operation. *Charles Wheatley Co.*

Check No. 4 On The Time-Saver Card

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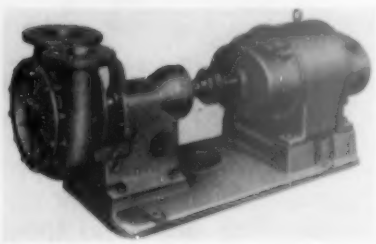


Centrifugal Pump Handles Corrosive Liquids

A new line of centrifugal pumps designed especially for handling corrosive liquids and slurries, designated as the Fig. 3715 series, embodies a number of improvements over earlier similar Goulds pumps. They are available with the entire fluid end in 316, Gould-A-Loy 20, or 304 stainless steels, all iron, all bronze, bronze fitted, all iron with stainless trim, or all bronze with stainless trim.

The Fig. 3715 pumps are of support-head construction, with the support cast integral with the bearing housing. The maximum liquid temperature limitation for operation of the pump has been raised to 350° F. with provisions for water cooling of the support head and quenching of the gland. Single or double mechanical seals can be provided if desired, and they also can be quenched.

The stuffing box is on the suction side of the impeller, and so is under suction pressure only. This insures long packing life, and keeps leakage at a minimum. Wide openings in the support head provide easy access to the stuffing box and gland. *Goulds Pumps, Inc.*

Check No. 5 On The Time-Saver Card

●

Powerful Six-Wheel Truck Made for Off-Highway Use

A powerful, new, extra-heavy-duty, six-wheel truck model, the RF-230, is specially designed for off-highway service. The new model, with gross-vehicle-weight rating of 60,000 lb., is powered by the new 201-hp. RD-501 engine, which delivers 430 lb.-ft. torque at 1,600 r.p.m.

All components of the RF-230 have been carefully coordinated with the engine to assure outstanding performance, economical operation, minimum maintenance, and long service life.

The RF-230 has the power required to haul 60,000 lb. g.v.w. over the roughest type of terrain on off-highway projects, and the ability to move a heavy load over semiimproved or improved roads for long distances at maximum safe speeds.

Equipment includes hydraulic, full-power steering; air brakes; 15,000-lb. front axle; 46,000-lb. rear bogie; 12-volt electrical system; 60-gal., right-side, step-type fuel tank; and 15-in. clutch. Standard wheelbase is 175 in.; optional wheelbases are available. *International Harvester Co.*

Check No. 6 On The Time-Saver Card

●

New Scraper Has No Parts Fixed With Fasteners

A new type of scraper, called the Bowen Itco hydraulic casing scraper, is a powerful, compact unit, having no weak spots, no protruding surfaces other than the blades, and no parts fastened by bolts or screws. The tool's heavy wall thickness gives it far greater strength than any string in which it will ever be run.

The precision-cast, hard-faced blades fit closely in slots in the body. Integral backup plates help to hold the blades in position. These plates receive the pressure of the bladder, which forces the blades outward to their full extent without pump pressure. When circulation is employed, the fluid is conveyed to the bladder through holes in a wash pipe.

The scraper is made up on the string with the box connection down. A bit is customarily installed. The tool is run into the section to be scraped, and the operation is begun. The scraper can be rotated or spudded as desired. Pump pressure is normally not necessary except in a particularly rigorous operation, or to wash out cement or excessive paraffin.

The tool's design makes it virtually impossible for the tool to ride over or bypass a protrusion in the casing wall. The operator can be sure that the unit will actually come to grips with any obstruction encountered, and with the

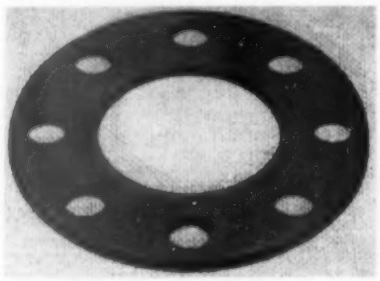
application of sufficient weight or rotation will shear it off. *Bowen Co. of Texas, Inc.*

Check No. 7 On The Time-Saver Card

●

Flange Protector Guards Against Corrosive Elements

A new flange protector forms a protective seal against corrosive elements. The new protector can be applied between any two flange segments on christmas trees, eliminating outer-ring guards. No maintenance or lubricants are required after the protector is installed.



It is simple to install and durable for permanent protection. It flows under pressure to allow positive flange makeup. The flange protector is made of Hycar and is available on a complete range of sizes through 16-in. Series 900. It provides an effective and economical means of sealing both ring joint and bolt studs.

These protectors are also adaptable for use on flanges at tank batteries, refineries, pump stations, loading docks, or other installations where it is desirable to protect ring joints and bolt studs. *Oil Center Tool Co.*

Check No. 8 On The Time-Saver Card

●

Metal Hats Now Available In Six Colors for Coding

Industries that prefer metal head protection may now establish a hard-hat color code with new aluminum nonfading metallic-colored safety hats and caps. Produced with special metal dyes, both the Roughneck and Shorty models are available in the following six colors at no extra cost: yellow gold, bronze, blue, grey, green, and the standard, silver.

Weather tests made with the new dyes indicate no fading after 1,000 hours of exposure to the hot brilliance of the Arizona-desert sun. Because of the improved production methods, the color process does not increase the cost and the hats or caps may be ordered in any quantity.

The full-brim aluminum hat and the short-brimmed aluminum hat are drawn from aircraft-grade aluminum and offer strength far beyond what their extremely light weight would indicate. They pass all standard drop tests for impact resistance. Both are constructed with the three-ribbed crown. These ribs add greatly to the strength of the crown and increase the angles of deflection more than 100 times. *E. D. Bullard Co.*

Check No. 9 On The Time-Saver Card

●

GLITSCH

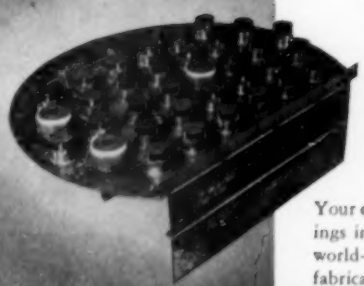
BUBBLE CAPS...

ANY SHAPE
ANY SIZE . . .

Existing dies of 287 different cap and riser designs, as well as data on various ratios of related areas, are available to your engineers during planning stages. Practical ideas for improvements to keep apace constantly changing petroleum refining and chemical processing are a GLITSCH service of world-wide proportions.

GLITSCH "TRUSS-TYPE" TRAYS

Lightweight, simple, adaptable with complete freedom of layout, GLITSCH "Truss-Type" mechanical design is not restricted to standardized patterns. You specify your process requirements.



Your engineering staff can effect definite savings in initial designing through GLITSCH world-wide experience in plans, design and fabrication of tower internals.

Cost analyses of tower internal equipment for fabrication in a wide range of material are available promptly.

Glitsch
FRITZ W. GLITSCH & SONS, INC.
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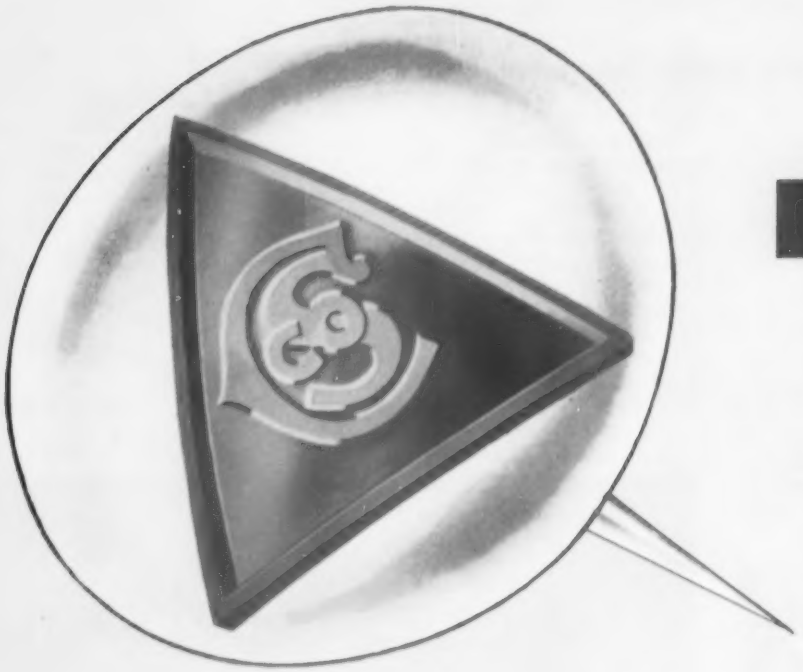


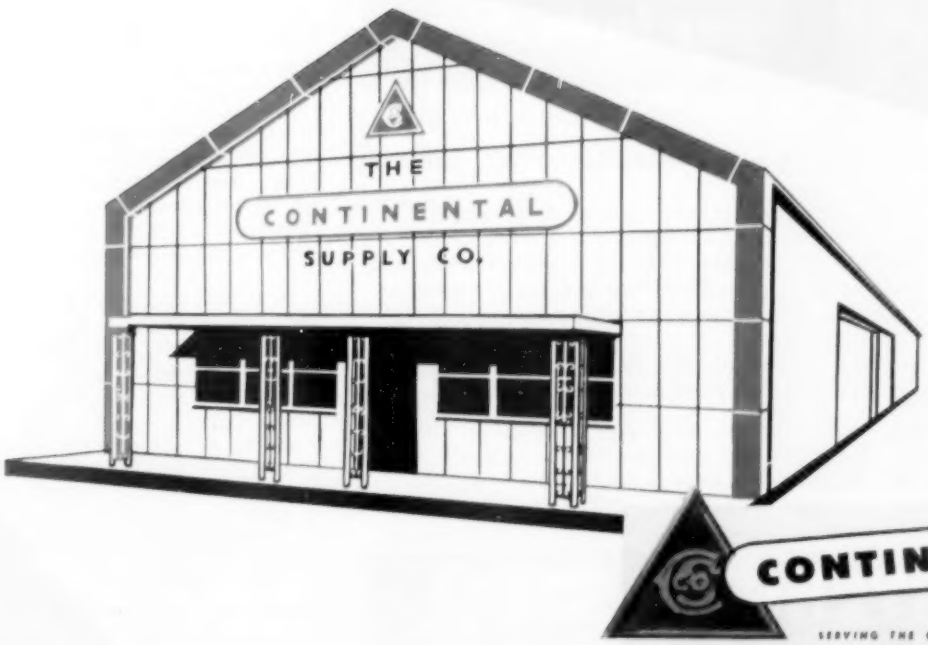
FOR

The constant geographical expansion of oil industry activities requires a like expansion in equipment and supply service.

Continental has, through the years, recognized the activity pattern. The result is that there are strategically-located "Green Triangle" stores in all principal oil fields of the world . . . stores giving *service* pin-pointed to the industry's needs.

PIN-POINTED

Service



CONTINENTAL

SERVING THE OIL AND GAS INDUSTRIES

THE CONTINENTAL SUPPLY COMPANY

General Offices: DALLAS, TEXAS

Representatives In All Principal
Oil Fields of the World

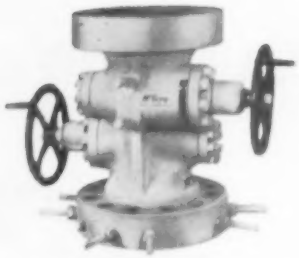
Petrochem Fire Hose Resists Deterioration

Petrochem, a new fire-fighting hose for the oil and chemical industries, is built to resist severe oil, chemical, and abrasive conditions which tend to deteriorate ordinary fire hose. A partial list of materials having little or no effect on Petrochem includes alcohols, bleaching agents, dry-cleaning solvents, hydrocarbons, ketones, oils, and synthetic detergents. It has excellent resistance to weak acids, even at boiling temperature, and to strong acids at room temperature.

Constructed of an oil-resistant neoprene tube and covered with strong Dacron yarn, Petrochem is impregnated with a skim coat of neoprene, making it oil resistant on both inside and out. It is a tough, flexible, easily handled hose, capable of withstanding temperatures as high as 375° F. and pressures of 500 psi. Petrochem is available in 1½ and 2½-in. i.d. sizes. *Quaker Rubber Corp.*

Check No. 10 On The Time-Saver Card

What's New... Use the handy Time-Saver Cards



Dual Valve Has Two Bores For Dual Completions

Dual Valve, two valves in one for dual completion with two full-size tubing strings, is to be used principally in the building of trees for production from two or three formations, saving the cost of drilling a second well.

The two tubing bores plus the casing annulus can be used as separate and individual passageways for many combinations of flowing, pumping, and/or gas lifting. The valve body has been so constructed as to house two separate valves with a single connecting flange for the main body, thus allowing two separate tubing strings to be hung independently. *McEvoy Co.*

Check No. 11 On The Time-Saver Card

Liquid-Level Device Gives Accuracy Miles From Source

An entirely new principle underlies a new remote-indicating liquid-level measuring system. Use of the Neher-White ionization chamber and a harmless radioactive source permits these systems to obtain high-accuracy indication miles from the point of measurement.

Only two connecting wires are required between measuring point and indicating station. Simple, inexpensive, mercury batteries provide continuous power for 1 year without replacement. This inexpensive system requires no amplifiers for Neher-White ionization-chamber output. Output is used directly to drive the remote-indicating meter or recorder-controller.

Contact with liquid is not necessary, making this Jordan system ideal for processes handling high-pressure, high-temperature, or corrosive liquids. Also designed for conventional liquid-level application where moving parts are troublesome. *Jordan Electronic Manufacturing Co., Inc.*

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immediate steel for oil and gas industry

Immediate steel is more than a slogan—it's a fact, here at Ryerson.

Here, the world's largest stocks of carbon, alloy and stainless steel await your call. Experienced steel men who know oil industry requirements are ready to work with you. And unequalled facilities are at your disposal for sawing, shearing, flame-cutting and otherwise preparing steel to meet any need.

So whether you need a single piece or a truckload, when you need steel quickly—call your nearby Ryerson plant.

Principal products: carbon steel bars, structurals, plates, sheets, tubing—alloy steel bars—stainless steel sheets, plates, pipe, tubing, bars—safety plate, reinforcing steel, babbitt metal, plastic pipe, machinery & tools, etc.

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JOSEPH T. RYERSON & SON, INC. PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA CHARLOTTE, N. C. • CINCINNATI • CLEVELAND • DETROIT • PITTSBURGH • BUFFALO • CHICAGO MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SPOKANE • SEATTLE

They're NEW

- Bulletins
- Catalogs
- Brochures

for your copy, check ✓ ✓ the Time-Saver Cards.

Film Forming Corrosion Inhibitors Also Aid Heat Transfer is the subject of Technical Paper No. 129. The paper contains many references to the protection afforded by filming amines and the attendant reduction in maintenance costs secured through protection against corrosion. Filming amines function by forming a nonwettable film over the metal surfaces contacted. The film acts as a barrier between the metal and condensate. *W. H. & L. D. Betz.*

Check No. 13 On The Time-Saver Card

●

Le Roi 600 CTM. A new two-page bulletin on the Le Roi 600 CTM (compressor tractor mounted) points out that the recently introduced power takeoff compressor is available for mounting now on any leading make of crawler tractor. A crawler with weak, worn tracts incapable of producing enough traction for dozing or scraping, usually has a good engine still worth saving. By mounting the 600 CTM on a tractionless tractor, a newer crawler will be relieved of the expensive and slow job of towing a heavier, harder-to-handle four-wheel portable compressor. Views of the 600 CTM show the unit mounted and unmounted without the protective tubular steel frame. Specifications and graphic representation of tool capacities are included. *Le Roi Co.*

Check No. 14 On The Time-Saver Card

●

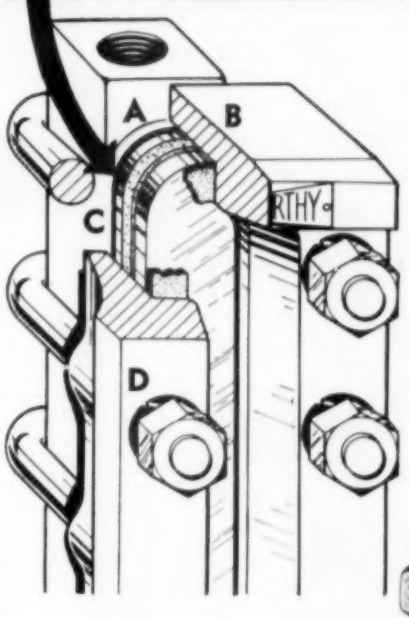
Petrofrac Increases Stripper-Well Production. Like other issues of The Acidizer, this data sheet describes the problems involved, the method employed in solving the problem, and the results of treating an actual stripper well. All pertinent conditions involved are discussed. *Dowell Incorporated.*

Check No. 15 On The Time-Saver Card

●

Disconnecting Fluid Power Takeoff. Publication of Bulletin No. 506 describes the performance of, and gives complete engineering data on Twin Disc connecting fluid-power takeoff Model 21 HUD-O and Model 27 HUD-

"RAISED FACE" OF PENBERTHY GAGES OFFERS EXCLUSIVE ADVANTAGES



A. Perfect alignment of frame with glass and gasket assured . . . leaks or glass breakage minimized.

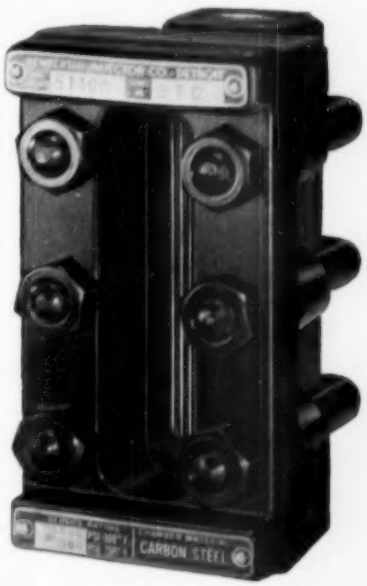
B. Cover completely encloses sides and ends of glass and gasket, thereby preventing blowouts and danger of accompanying hazard.

C. For high pressure service the close fit over raised face gland resists distortion of cover due to bolt loading stresses.

D. Drop-forged steel frame, heat-treated alloy steel liquid chamber and bolts withstand rugged service conditions.

In Addition to These Operating Advantages, Benefits in Field Service Include . . .

- Easy glass or gasket replacement and gage cleaning facilitated by fully accessible RAISED FACE.
- Correct alignment in reassembly.
- Repair of gasket surface without removing assembly from vessel.

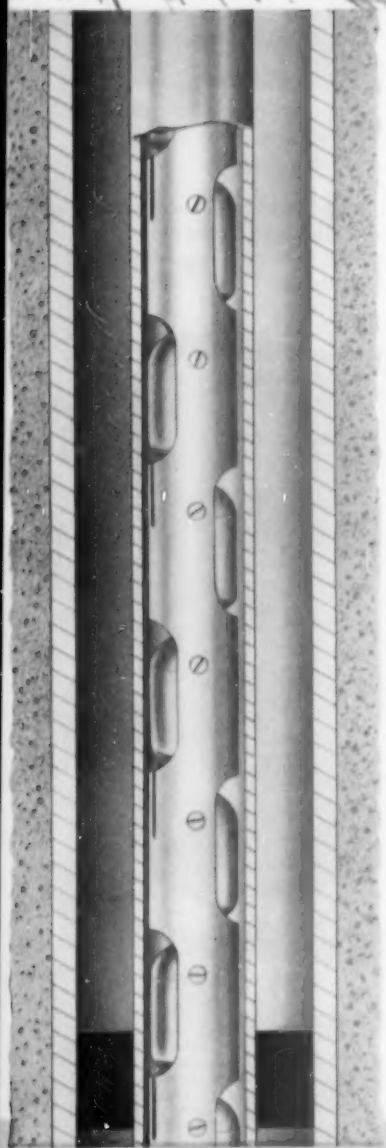


Reason enough for you to investigate the use of Penberthy gages in your operation. Complete units and replacement parts are stocked by leading suppliers. Use the coupon on page 133 to obtain more detailed information.

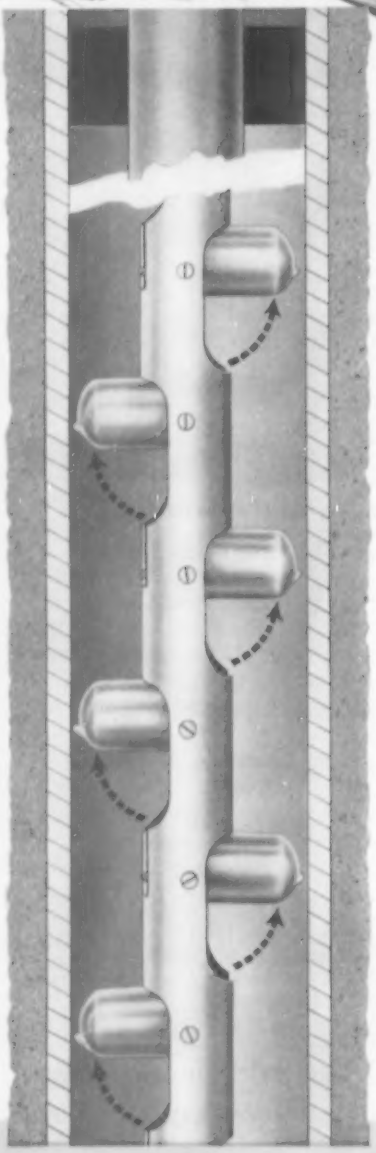
There's Certain satisfaction in **PRODUCTS BY** PENBERTHY

- CYCLING JET PUMPS
- EJECTORS
- INJECTORS
- ELECTRIC SUMP PUMPS
- EDUCTORS
- EXHAUSTERS
- SYPHONS

Now Welex gives you



TOOL RUNS SMOOTHLY DOWN *2-INCH* TUBING IN CLOSED POSITION.



FULL-POWERED JETS ARE SNAPPED INTO POSITION AT FIRING ZONE.

New Swing-Jet

Permanent-type well completions become more practical . . . more profitable with the new Welex Swing-Jet Perforator . . . designed to give you deep, positive perforations. Folded into a newly-engineered carrier, full-power jet charges are run through small tubing and are snapped into horizontal firing position to be fired at the exact production zone you desire.

Perforations are 90° to the axis of the bore hole . . . go straight back into the formation giving you deeper penetration and more zone drainage.

When ready to fire, the new Welex

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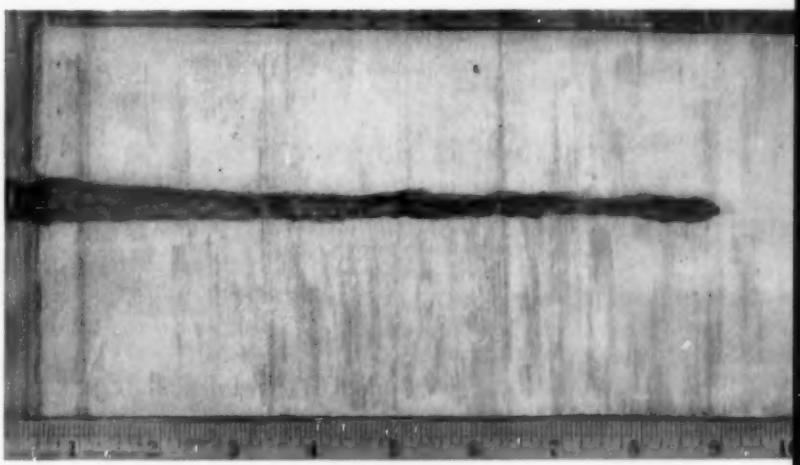
Deeper Penetration

IN PERMANENT-TYPE WELL COMPLETIONS

Swing-Jet is centralized in your casing. You get four *effective* shots per foot . . . all positively perforating your casing and giving you *deep* penetration into the formation.

Varying well conditions were considered when designing the new Swing-Jet; safety features were built right into the tool. The Swing-Jet is designed to operate at up to 10,000 p.s.i. and 300° Fahrenheit. The tool can not be detonated unless every jet is in the correct firing position. And, the Swing-Jet can be retrieved by the operator . . . even after jets have been opened to firing position . . . without damage to your tubing!



THE NEW JET WITH A WALLOP!

Newly-designed jet guarantees maximum performance! Test firing UNDER FLUID shows jet passes through ½-inch of water to perforate ⅜-inch casing and penetrate 9 inches of aged neat cement! Entrance hole has ½-inch diameter!

and be SURE!

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the texture-engineered composition cups

give constant high efficiency despite wear

...outlast other packings over 3 to 1!

YOU name the fluid and we can tell you of similar Darcova Pumcup installations that save plenty of dollars. And it's simplicity itself to change over to Pumcups.

Here are two reasons why Darcova Pumcups are more efficient than ordinary packing ... (1) The unique principle of Darcova Pumcups drastically reduces fluid slippage for the entire life of the Pumcup. (2) Texture engineered, Darcova Pumcups are made in many types to meet precisely a wide range of different fluid, pressure and temperature conditions.

Net Advantages — Pumcups maintain high volumetric efficiency, permit reduced operating speeds, save power, prolong equipment life and eliminate the need for frequent replacement shutdowns.

Send for free Bulletin No. 4401 on Pumcups for reciprocating pumps; Bulletin No. 4502 on Pumcups for air or hydraulic mechanisms ... or ask for a Darcova engineer to help you solve your tough problems. *Write today!*

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

DARCOVA THE ORIGINAL COMPOSITION CUP

PUMCUPS

OO. On drilling rigs, hoists, shovels, and draglines that demand frequent and complete disconnection of power source from driven equipment, the new fluid power takeoff Model HUD combines smooth characteristics of fluid connection with positive release from the driven load. The bulletin gives performance and capacity charts, and actual applications. *Twin Disc Clutch Co.*

Check No. 16 On The Time-Saver Card

●

Stock Roller-Chain and Sprockets is the title of Catalog 754, a 64-page illustrated book. Catalog 754 covers a complete line of roller-chain stock sprockets. Stocked by distributors in every industrial area, the line includes minimum-bore sprockets for reboring as well as finished-bore and Taper-lock bushed sprockets which are ready to use. Chain selection and application data is included in the catalog. *Diamond Chain Co., Inc.*

Check No. 17 On The Time-Saver Card

●

Storage Tanks For All Uses, Steel-Plate Construction. Catalog 54B features material specifications, tank design data, foundation recommendations, accessories and fittings, computing tables for size and capacity, welding procedures, testing methods, and information on all types of storage tanks and general steel-plate construction. Illustrated are examples of every type of storage tank designed and erected by the firm. *Hammond Iron Works.*

Check No. 18 On The Time-Saver Card

●

Boiler Water. The need for proper designing of the mineral content of boiler water to prevent boiler losses due to corrosion and scale is described in a new six-page folder. Tracing methods of research and pretreatment of water, the new folder points out the special knowledge and experience required to determine just what an industrial boiler needs to make steam of the required purity at minimum cost and maximum protection against boiler failure. *Hall Laboratories, Inc.*

Check No. 19 On The Time-Saver Card

●

D-C Indicating Amplifier, Type 2HLA-3. Engineering data and performance curves are presented on this highly stable and reliable instrument in Bulletin 1A. The instrument is designed as a polarity-sensing microvoltmeter for the direct measurement of low-level d.c. signals and as an amplifier to provide flat response to greater

for High Pressures . . .

AMERICAN IRON
STANDPIPE AND MANIFOLD FITTINGS!

Designed and manufactured to operate efficiently under extreme high pressures. American Iron fittings are tested to 4000 pounds hydrostatic pressure. Manufactured in a variety of versatile designs, fittings are adaptable to manifolds of any construction and are available in welded type or with standard threaded connections.

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NOW! MORE AND FASTER DELIVERIES
at LOWER COST!

New and faster methods of material handling in loading and unloading trucks have offset the rising costs of delivering merchandise of every description. Now Anthony Lift Gates reduce costs still further by: lighter weight—to permit more payload per trip—more payloads per day; by using only ONE cylinder and ONE control lever for ALL operations—greatly simplifies and cuts manual time per delivery—74% fewer operating parts minimizes maintenance.

10 important reasons why Anthony Lift Gates can cut your delivery costs up to 50% are explained in New Brochure just off the press. Send for your copy today.

One Cylinder alone does all operations — opens, closes — lifts and lowers gate.

ANTHONY The *Power* to lower delivery costs.

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JOURNAL READING TIME

than 20 c.p.s. suitable for driving most commercial pen motors or galvanometer recorders. *Doelcam Corp.*

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●

New Pump Data. The new Aldrich air-driven hydraulic pump is described fully in Data Sheet 36. Material includes complete information on design, installation, and operation, and it is illustrated by photographs and sectional and dimensional drawings. The Aldrich air-driven hydraulic pump is designed to meet demand for small-volume capacity at low and high pressures. Available in either single or double-acting models, the pump develops up to 30,000 psi. at 90 psi. supply. *The Aldrich Pump Co.*

Check No. 21 On The Time-Saver Card

●

Worden Gravity Meter. The lightweight Worden gravity meter is fully described in a new Bulletin GM-201. The Worden gravity meter, weighing only a fraction over 5 lb., has proved ideal for field use in all climates and terrains. Its accuracy, dependability, and light weight are due to the use of a vacuum-sealed, self-compensating element made of nonmagnetic quartz with near-perfect elasticity. *Houston Technical Laboratories.*

Check No. 22 On The Time-Saver Card

●

Operation Recorders. A new Bulletin OP1505 describes and illustrates the company's line of electrical and mechanical operation recorders, both round and strip-chart models. Round-chart electrical-operation recorders are designed to furnish a record of the time of occurrence and duration of an operation. Recorders which will make up to 12 records simultaneously are available. Contactors suitable for service with the recorders are also listed in the bulletin. *The Bristol Co.*

Check No. 23 On The Time-Saver Card

●

Dall Flow-Tube Bulletin No. 115-L3 describes a new short-differential producing-metering device which has the lowest permanent loss of head of any known velocity-increasing differential producer. The bulletin includes information on: recovery characteristics, accuracy, applications, range, flow formula, laying length, and working pressure of the device. Also included are sections on: installation, power consumption, effect of approach and downstream piping and fittings, and location of instruments. *Builders-Providence, Inc.*

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Specify STRATOFLEX

★ DETACHABLE HOSE FITTINGS

★ FLEXIBLE HOSE ASSEMBLIES

STRATOFLEX Hose Fittings and Hose Assemblies are designed to give dependable service and maximum performance. Cost-minded operators in the industry recommend STRATOFLEX! Whatever your requirements in flexible hose assemblies and detachable reusable hose fittings or elbow hose fittings — specify STRATOFLEX!

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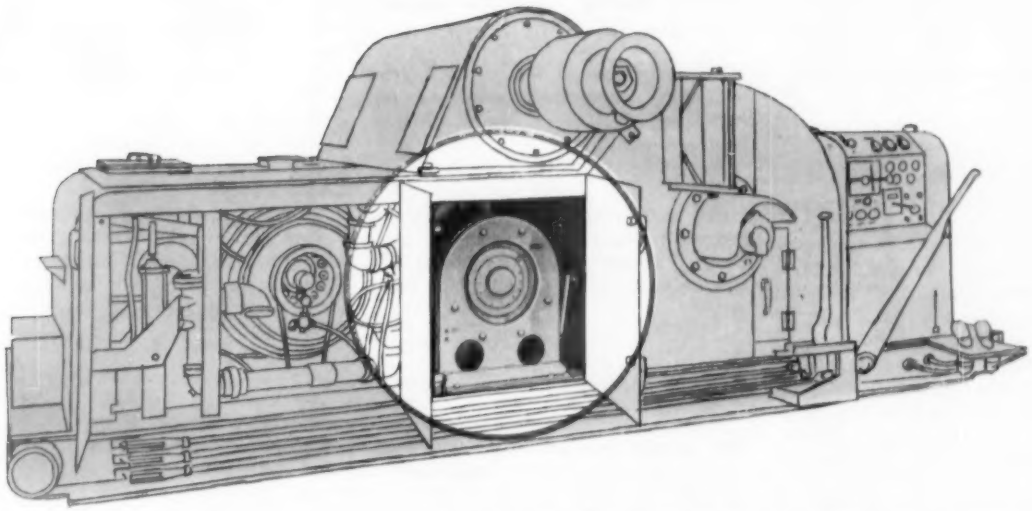
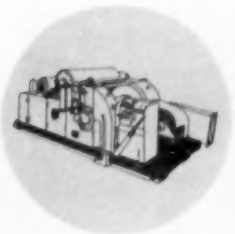
UNIT RIG'S
HYDROMATIC BRAKE
is an integral part of the draw works . . . .
AS IT SHOULD BE!



UNIT RIG'S Hydromatic Brake is built into the draw works . . . it is NOT a separate package. This integral unit, with built-in piping, is readily accessible.

The brake is driven from the jackshaft through a clutch. It is equipped with UNIT RIG'S exclusive variable flow control and dump valve assembly to provide fast pipe fall with maximum braking power as desired. This feature keeps trip time to a minimum.

The UNIT RIG built-in Hydromatic Brake is just one more reason why your next draw works should be a UNIT RIG.



UNIT UNIT RIG

UNIT RIG & EQUIPMENT CO.
TULSA, OKLAHOMA, U. S. A.

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A 5410

EQUIPMENT MEN . . . in the News

Graver Announces New Department Manager

Leonard Limon has been appointed manager, industrial boiler feed department for Graver Water Conditioning Co., division of Graver Tank & Manufacturing Co., Inc., New York. The announcement was made by H. T. Sulcer, vice president and general manager.

Limon joined Graver in 1949 in charge of the estimating department, and more recently has been sales engineering manager.

Honeywell Names Grant As Los Angeles Branch Manager

R. B. (Bob) Grant has been appointed Los Angeles branch manager for Minneapolis-Honeywell Regulator Co. Since 1949 he has been regional industrial manager for the Pacific region.

Grant joined Honeywell 14 years ago. He started as sales engineer in the company's industrial division in San Francisco, was transferred to Los Angeles as sales engineer in 1941, became Los Angeles branch industrial manager in 1946, and regional industrial manager in 1949.

Republic Supply Promotes Three to Key Positions

McLAWHON

A new vice president and two other important promotions were announced recently by James E. Webb, president of Republic Supply, Oklahoma City, in organizational changes to improve management functions necessitated by expanding business volume.

Arthur McLawhon, formerly assistant to the president, was elected a vice president and assigned the newly established responsibility of comptroller of the company.

He will supervise analysis and improvement of general procedures and management functions. He will also direct those account, auditing, and coordinating functions which provide essential information to the operating managers of the company.

R. E. McCullough, formerly purchasing agent, was promoted to assistant to the president, where his years of experience in purchasing will provide top management assistance on high-level negotiations and purchasing contracts.

McCULLOUGH

R. J. HOOD

Replacing McCullough as purchasing agent is R. J. Hood, formerly associated with Brown & Root, Inc., Houston. With Hood's appointment as purchasing agent, several additional responsibilities were assigned to the position.

National Names Bader to Represent Engine Division

G. L. Bader, who has had more than 25 years in the diesel engine industry, has been appointed a special representative of the Engine Division of The National Supply Co., manufacturer of Superior and Atlas engines. He will be concerned principally with engines for natural gas and petroleum pipeline use.

Bader was employed formerly by Fulton Iron Works, Baldwin-DeLaval, Busch Sulzer Co., and Nordberg Manufacturing Co. Since 1951 he has served as a consulting engineer.

Happy Holds Heat Transfer Short Course

Nineteen engineers from sixteen pipeline, natural gas, and petroleum engineering and construction firms recently attended the first annual Happy Co. heat transfer short course in Tulsa.

In charge of the course was John Mahaffey, Happy Co. vice president, and chief instructor was Wf Roberts, Happy rating engineer.

Lecture and discussion, totaling 30 hours during the 3-day course, included rating and selection of atmospheric sections; shell-and-tube equipment; fin-type air-cooled equipment; water, oil, and gas equipment; cooling and condensing of hydrocarbon streams; fuel-testing procedure; quotation evaluation, history of air-cooled equipment; and theoretical basis of all types of heat-transfer equipment.

Attending the course were: Eric Jennett, Brown & Root, Inc.; Ed Dunham, Fish Engineering Corp.; G. B. McIntosh, Transcontinental Gas Pipe Line Corp., all of Houston; Morris Gitterman and E. U. Nakayama, Phillips Petroleum Co., Bartlesville, Okla.; S. N. Robinson, Stearns-Roger Manufacturing Co., Denver; Tom H. King, Magnolia Petroleum Co., Dallas; Ervin Peiffer, Natural Gas Pipeline Co. of America, Fritch, Tex.; I. H. Ferguson, United Gas Pipe Line Co., Shreveport, La.; Robert J. Morely, Northern Nat-

Attending the Happy Co. 30-hour heat-transfer course were, seated: Stuart Sack and Quinton S. Drake. Standing: Tom H. King, Wf Roberts, I. H. Ferguson, and Morris Gitterman.

ONE OF A SERIES

OF SHOP TALKS

BY

JOURNAL EDITORS

Why does the Journal carry field reports?

Time was—many years ago—when the Journal reported the progress of every well drilling in the country every week. Then it was virtually the only source of such information.

Now, with 40,000 to 50,000 wells completed every year, no one publication can carry all the details on a national basis.

We still continue to devote a great deal of manpower and space to watching and recording the industry's drilling and discovery activity—but in a selective manner. A whole section of every issue lists the significant wildcat successes and failures all over the country as culled, analyzed, and interpreted by our expert staff. We do it . . .

• Because discovery of oil and maintaining reserves is the industry's most basic function. Without it the rest of the industry would deteriorate fast.

• Because knowledge of where oil is being found affects every branch and activity of the entire industry. It is the beginning of planning for drilling and production programs, pipelines, refineries, processing plants.

• Because we know that readers in all branches of the industry, in all parts of the country, read our field reports regularly, use them, and depend on them.

We get reports on every well drilled —location, depth, formations, status, etc.—and we use this information for statistical summaries and periodic roundup articles. But our field reports are selected highlights, carefully tailored to fit the needs of operating men in distant areas or in other divisions of the industry who want a quick view of where oil is being found.

We confine our discussion to the progress and results of the most significant wildcats and confirmation wells—wells that really mean something from the standpoint of geological interpretation, area trends, or volume production.

Without such information an oil man couldn't anticipate which way the industry will move next. That's why the Journal carries field reports.

THE OIL AND GAS JOURNAL

ural Gas Co., Omaha, Neb.; Quinton S. Drake, Continental Oil Co., Ponca City, Okla.; W. R. Stockton and K. H. Bacon, Warren Petroleum Corp.; John A. Sutherland, Sunray Oil Corp.; John Monday, Gasoline Plant Construction; and R. G. Ruth, Dresser Engineering Co., all of Tulsa; and Phil Powell, Wolverine Tube Division, Calumet & Hecla Consolidated Copper Co., Houston; and Charley Kuthe, Wolverine Tube Division, Detroit; Stuart Sack, El Paso Natural Gas Co., El Paso, Tex.

Haynes is Manager, Oilwell Engine-Compressor Sales

J. M. HAYNES

The appointment of J. M. Haynes as manager, engine and compressor sales for U. S. Steel's Oil Well Supply Division with headquarters at Dallas was announced recently by G. A. Hays, director of product sales. Haynes replaces W. C. Ramsey, retired.

Haynes started with Oilwell in 1934 at Mount Pleasant, Mich., in machinery sales and service. In 1941 he was appointed sales engineer at Oil City, Pa. In 1947 he went to Dallas as assistant manager, engine sales and service.

In 1951, Haynes was appointed assistant manager, engine and compressor sales, holding this position until his present appointment.

Globe Appoints Wardle As General Sales Manager

LEE WARDLE

Lee Wardle has been appointed general sales manager for Globe Oil Tools Co., Los Nietos, Calif., according to Charles E. Whittaker, president. Wardle started with Globe in 1938 when he beecame a member of the sales organization, working in the Los Angeles basin. For the past 4 years he has been California sales manager, establishing branches in Ventura and Bakersfield.

Wardle is well known throughout the California oil-well drilling industry, having spent several years in oil-field work prior to joining Globe.

Oil Center Tool Opens Casper Branch

A new permanent sales and service branch which will serve the Rocky Mountain-Williston area has recently been opened by Oil Center Tool Co. at Casper, Wyo., John Maher, president, has announced. At the new Rocky Mountain headquarters, Oil Center Tool will carry a complete line of all products in stock. In addition O.C.T. will maintain complete testing facilities for new equipment and for rebuilding and testing salvaged well-head equipment. M. E. (Mike) Hunter is district manager in charge of the new branch. Harry McDow is sales representative.

Grove Adds Five Men to Houston Area Staff

Appointment of five additional men to the Houston area sales engineering staff has been announced by Grove Regulator Co. to serve expanding markets for the new Grove Seal O-ring gate valves.

J. D. HICKS

PAUL NERREN

C. B. WRIGHT, JR.

E. E. HULSEY

Serving as assistant division sales manager is J. D. Hicks, who was district manager for the firm's Corpus Christi office during the past several years.

Paul Nerren, before joining the Grove organization, served for 20 years with a nationally known valve manufacturer, where for 12 years he was in charge of assembling and testing, and for 8 years served in sales and service capacities.

C. B. Wright, Jr., prior to joining the Grove sales engineering staff, specialized for many years in oil and gas production equipment, with field experience in Texas, Oklahoma, Louisiana, and Kansas.

Eldon E. Hulsey, with 20 years of experience in the Gulf Coast, North Louisiana, and Mid-Continent areas, was for 13 years with the refining and pipeline division of an oil company, and subsequently served as district sales manager for 5 years with a nationally recognized tool and equipment manufacturer.

Bartolina to Manage Moorlane Manufacturing

BARTOLINA

The appointment of E. A. Bartolina as manager of Moorlane Manufacturing Division has been announced by E. L. Hagar, vice president and general manager of Moorlane Co., Tulsa. Bartolina succeeds Rex Bircket who is no longer with the company.

Bartolina graduated from University of Oklahoma in 1929 as a mechanical engineer, and before joining Moorlane was a division manager of Consolidated Gas Utilities Corp.

Lone Star Steel Co. Opens Office at Tulsa

Ray M. Sexton, who has been a resident in Tulsa for many years, and who was formerly with W. C. Norris and Mid-Union Drilling Corp., Dallas, in July was made representative for Oklahoma, Kansas, and Colorado for Lone Star Steel Co.

Late in July, Sexton was tour guide for a group of Tulsa area purchasing

agents and other oil company representatives who participated in an inspection trip to the company's pipe mill facilities at Daingerfield, Tex.

Bellco Names Catlow As Executive Vice President

H. B. CATLOW

Harry B. Catlow, prominently identified for many years with the oil-equipment supply industry, has been appointed executive vice president of Bellco Industrial Engineering Co. of Houston, according to an announcement released by Warren S. Bellows, president.

Since 1942 Catlow had been associated with Republic Supply Co. He recently resigned as vice president in charge of sales for that organization. Prior to joining Republic Supply, he served as district manager at Houston for Republic Steel Corp., Truscon Steel Division.

Bellco Industrial Engineering specializes in the construction of industrial, chemical, petrochemical, and power-plant installations.

B. S. & B. Announces Sales Department Changes

Floyd C. Myers, manager of oil-field sales for Black, Sivalls & Bryson, Inc., has announced the following personnel changes:

Hugh Kirkpatrick has been appointed manager of the Kilgore, Tex. branch. He has been with B.S.&B. since August, 1953, having previously worked for Cities Service Oil Co. as a trainee-engineer and later as petroleum engineer, assigned to secondary recovery projects at Cities Service's home office in Bartlesville, Okla.

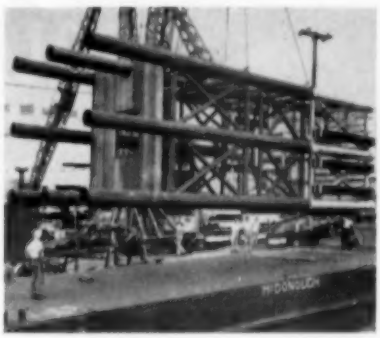
R. P. (Dick) Morris has been transferred from Wichita Falls to Gainesville, Tex., as sales representative. He joined B.S.&B. in February 1954, and worked at the Alice, Tex., branch. His previous oil-field experience was as field engineer with Warren Petroleum Corp. at Garvin, Okla.

Jones Made Lane-Wells Mid-Continent Engineer

Norman C. Jones, formerly radioactivity engineer with Lane-Wells Co. at Casper, Wyo., has been appointed Mid-Continent division field engineer and transferred to Oklahoma City, according to R. B. Downing, Mid-Continent division manager.

Sammie N. Conley, formerly radioactivity operator, has been appointed a district sales engineer trainee in the Rocky Mountain district at Newcastle, Wyo.

Higgins Delivers Offshore Production Platform

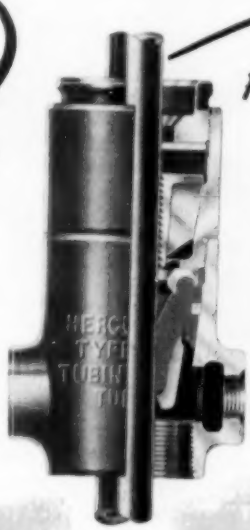


During the last week of July, Higgins, Inc., delivered to Shell Oil Co. a new type structure for use around offshore christmas trees. Known technically as a well-protective jacket, it is built of 18-in. casing in its main members and its top platform will stand 47½ ft. high. It serves as protection for the well head and provides a convenient method for servicing.

HERCULES "TYPE J-5" TUBING HEAD
The Head for the Job

Whether you are suspending 10,000 feet of 2" Tubing or 4,500 feet of 5½" Casing. A full-opening Head constructed of pressure cast steel hydrostatically tested to over 4000 psi. Has Hercules original overhead packing arrangement and hinged slips.
An ideal head for pumping or flowing wells; or for acidizing and repressuring projects. The Hercules Tubing Stripper may be used with this Head on wells flowing intermittently, or to wipe tubing.

A "MUST"
For Flowing Wells:



The dual-purpose "Type J-5-S" Stripper Tubing Head is basically a "Type J-5" Tubing Head with a bowl (top section) screwed into the packing nut thread. The Hinged Slips and overhead packing arrangement are placed in the bowl (top section) with the tubing stripper in the body (lower section), thus permitting tubing to be run-in, or removed, under pressure. The test pressures given for the "Type J-5" Tubing Head are also applicable to the "J-5's" Stripper Tubing Head.

"TYPE J-5" TUBING HEAD

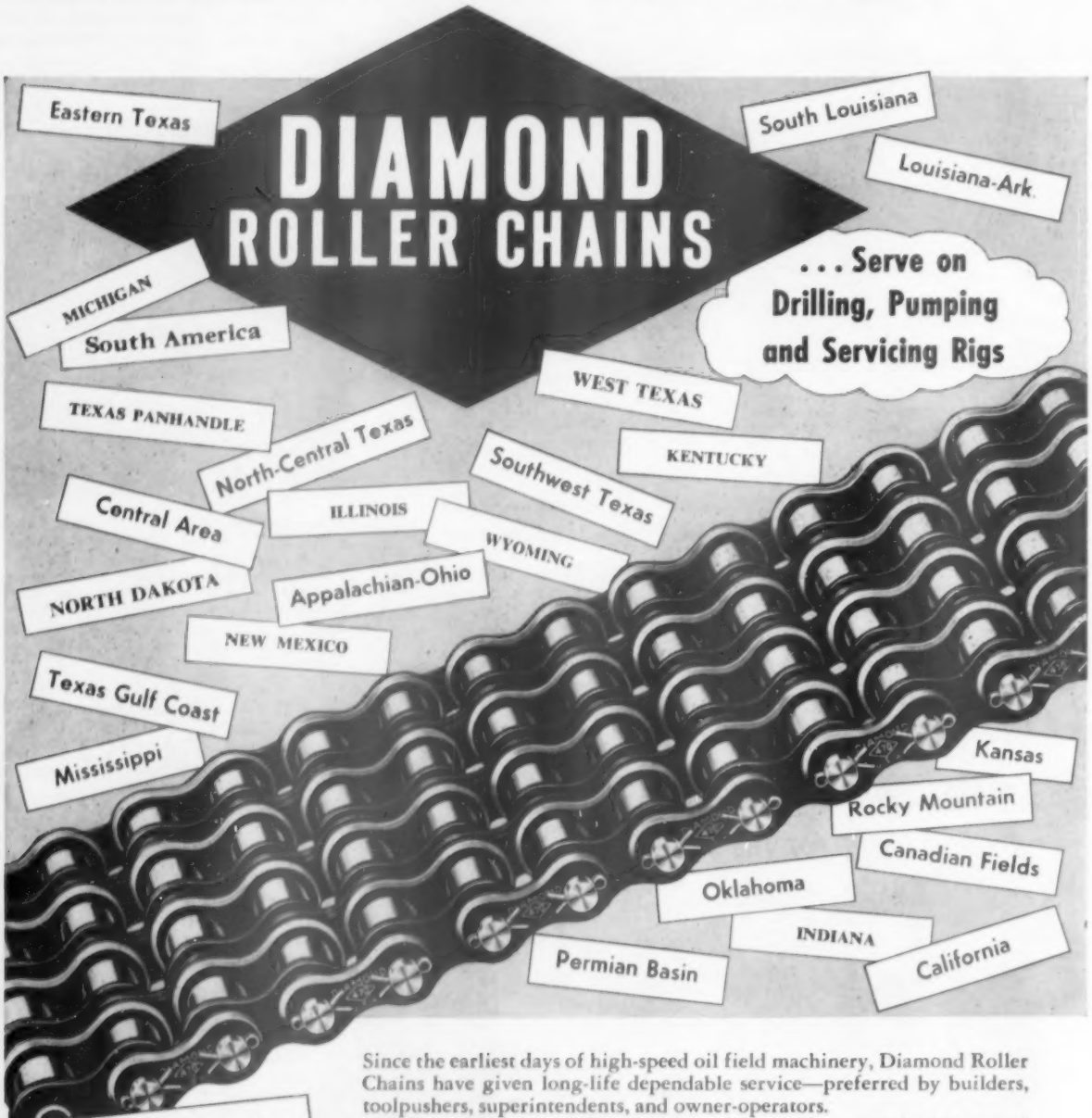
"TYPE J-5-S" STRIPPER TUBING HEAD

SOLD AT ALL SUPPLY STORES

Write for complete information

HERCULES TOOL COMPANY
Manufacturers of Oil Field Equipment
SINCE 1924 GENERAL OFFICES AND PLANT • TULSA, OKLAHOMA
Export Representative Oil Field Equipment Co., Inc. • 30 Church Street, New York, N. Y.

IN ALL ACTIVE OIL FIELDS



Shot-Peening Since 1944
Diamond Chain has long recognized that certain types of internal stressing of chain parts would increase fatigue resistance. To this end, link plates have been specially processed and chain rollers and other parts have been shot-peened since 1944.

And Patented BCL Connector
The patented bushed center plate connector for multiple-strand press fit center plate chain has simplified connecting and disconnecting and assures full value in the chain at the connecting link.

Since the earliest days of high-speed oil field machinery, Diamond Roller Chains have given long-life dependable service—preferred by builders, toolpushers, superintendents, and owner-operators.

Wherever there is oil field activity,—there also you will find Diamond Chains on the finest drilling, servicing and pumping equipment that American builders produce.

DIAMOND CHAIN COMPANY, Inc.
Dept. 475, 402 Kentucky Ave., Indianapolis 7, Ind.
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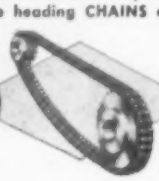
Offices and Distributors in All Principal Cities
Refer to the classified section of your local telephone directory under the heading CHAINS or CHAINS-ROLLER

DIAMOND  **ROLLER CHAINS**

EXPLORATION

Two Dry Basins Are Firing Up

by John C. McCaslin

A COUPLE of bone-dry basins have come up with two very interesting and significant wildcats. Indications are that the Dalhart and Raton basins, separated only by the Sierra Grande uplift, might soon be tapped for oil or gas.

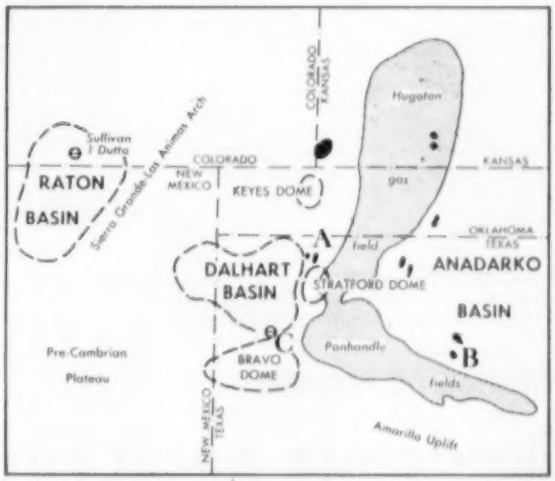
For the first time in several years this northwestern Texas Panhandle basin has reported a wildcat of considerable importance. It is the Standard Oil Co. of Texas 1 Ernest-Guilloud, Sr., a tight hole in Section 54, Block LE, G&M Survey, 12 miles southwest of the town of Hartley (C on map). The test is about 22 miles northwest of the two-well Channing-Pennsylvanian field on the northeastern flank of the Bravo dome, one of the prominent geological features of the Panhandle.

This wildcat, which may prove the oil and gas possibilities of the rather small basin, has reached total depth of 7,453 ft. A drill-stem test was reported at the 6,200-ft. level with recovery hinted as being 900 ft. of free oil. No other details have been forthcoming. Should the showings be found to be Pennsylvanian, the wildcat would become another in the growing list of discoveries which are rapidly encircling the huge Hugoton-Permian gas fields in the four-state area of Colorado, Kansas, Oklahoma, and Texas.

In recent weeks the Texas Panhandle has put on record two new Pennsylvanian discoveries, one from the Cisco, the other from the granite wash. Out in the deep portion of the Anadarko basin area of north-central Gray County (B on map), Phillips Petroleum Co. recently gave the Panhandle a major oil discovery at 1 Delp. The big well flowed oil at a daily rate of 3,720 bbl. through small chokes from the granite wash.

Closer home to the Dalhart basin, Humble Oil & Refining Co. has a new Cisco gas discovery indicated at 1 Sheldon (A on map), 3 miles southwest of Kerrick in northeastern Dallam County, almost on the basin's edge. This gas strike is 7 miles west of new Stratford-Cisco gas field of Sherman County, and 17 miles south of the Oklahoma Panhandle's Keyes-Pennsylvanian district.

Geologic sketch . . . The Dalhart basin is an area of little previous drilling. It is a depression northwest of the Amarillo uplift. The small basin lies chiefly in Hartley County, Texas, and is intermediate between the Amarillo uplift and the mountains of New Mexico. The basin is connected to the basin area south of the Amarillo uplift by a very narrow trough, lying just east of the Bravo dome. The Amarillo uplift, which is the northwest extension of the Oklahoma Wichita Mountains, is the major structural feature of the Texas Panhandle. It is a buried granite ridge, consisting of a series of peaks and saddles. The Bravo dome is the westernmost of this series of peaks. It is adjacent to and may be part of the pre-Cambrian Plateau of New Mexico. The dome has no production.



Two little-drilled basins, the Dalhart and Raton, have come up with a pair of interesting wildcats. Letters on map of five-state area are keyed to text.

There are two other interesting structures in the area, the Stratford and Keyes domes. These two uplifts are not northern extensions of the Amarillo uplift, but are separate features trending toward the granite ridge and meeting it in Moore County, Texas. They separate the Dalhart and Anadarko basins.

With new production being opened at the gates of the Dalhart basin in Sherman County, Texas, and the bright prospects of a discovery in the basin itself at Stanotex's wildcat, the coming months should see a lot of interest in the area.

Raton Basin

Across the Sierra Grande arch in the Raton basin is an interesting Pennsylvanian prospect. It is Bruce Sullivan Drilling Co. 1 Dutto, 10 miles east of Trinidad in Las Animas County, southern Colorado.

This is another test in a little drilled area. The wildcat tested good oil shows in the upper Madero section at 3,338-51 ft. There is no Pennsylvanian production within 100 miles. Nearest oil production is at Florence-Canon City field, the second oldest field in the country.

Basin comparison . . . The Dalhart and Raton basins have a lot in common. Both are rather small in area. Both have had little previous drilling. Consequently there is scant knowledge of either one.

Since spring there has been a marked pickup in Raton basin exploration. There are currently seven wildcats drilling in Las Animas County; nine are under way on the New Mexico side of the basin in Colfax, San Miguel, and Torrance counties. Continental Oil Co. has a wildcat program under full steam in Colfax County. The greatest potential oil reservoirs in the Raton basin are the 8,000 ft. of Pennsylvanian sediments. The Cretaceous-Dakota sands rank in second place as targets for the drill in this campaign.

PRE-ALBIAN PALEOGEOLOGY . . . A reconstructed geologic picture of surface over which Albian stage was deposited. Map shows only one of several such transgressive overlaps in Cretaceous. Fig. 1.

ISOPACH MAP, lower Albian Green sands, showing prospective reservoir thicknesses up to 50 m. in vicinity of possible stratigraphic or stratigraphic-structural traps. Fig. 2.

POTENTIAL OIL PROVINCE

Bordeaux Basin Find Stirs French Hopes

by Louis Christian

RECENT discovery by Esso Standard, S.A.F., in April 1954 of what promises to be a major oil accumulation at Parentis, in the Bordeaux or Aquitaine basin of Southwest France, focuses attention on the oil possibilities of the Paris basin of northern France and southern England. Paleogeologic studies by the author reveal regional structural and stratigraphic conditions in the Paris basin and certain other areas in France which are favorable for oil accumulation.

Structural Setting

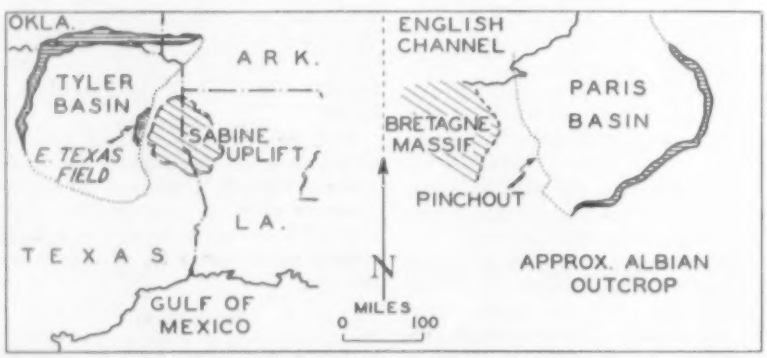
The Paris basin is one among three major basin areas in France which contain sufficient thicknesses of marine sediments to be of interest to the petroleum geologist. The Paris basin is separated from the two main sedimentary basins of southern France by the Bretagne Massif and Massif Central—outcrop areas of metamorphosed Paleozoic and ancient crystalline rocks. Beneath a thin veneer of younger sediments, Cretaceous and Jurassic strata of the Paris basin are gently folded along northwest-southeast lines. Few adequate tests have been made in a conscientious attempt to find oil in these rocks.

Late Mesozoic History

Esso Standard's interesting Lower Cretaceous discovery at Parentis and other Cretaceous and Jurassic oil and gas occurrences in southern France naturally lead us to ask. "What about the possibilities of these late Mesozoic rocks in the Paris basin?"

Shallow epicontinental seas occupied most of the Paris basin throughout late Mesozoic time. Only sporadically did gentle warping result in local land areas of low relief along the basin margins. Besides limestones and marls similar to those of southern France, coarse gravelly deltaic sands and shales, lagunal muds, and lignitic deposits dominate parts of the Lower Cretaceous section along the western flank of the Paris basin. These near-shore deposits were derived from an old western land mass along what are now the coasts of Normandy and Cornwall.

Middle and Upper Cretaceous strata



PARIS BASIN-TYLER BASIN ANALOGY . . . Subsurface extent (dots) and surface outcrop (horizontal lines) of Woodbine sand of East Texas (left) and lower Albian "Green sands" of the Paris basin (right). Structure, outcrop, and pinchout pattern of the two basins are analogous when one basin is rotated about 140°. Fig. 3.

include finer-grained sands and shales, and the deposits of organic lime made famous by the "Chalk Cliffs of Dover."

Several notable overlaps (see Fig. 1) occur within and below the Cretaceous, both near the Franco-Belgian border, and along the western side of the Paris basin. The updip western edge of the lower Albian green sands (Fr. sables verts) is one of the most promising of these overlaps, and has attracted the attention of American as well as French geologists (see Fig. 2). The wedging out of other Lower Cretaceous and Upper Jurassic sands against the Bretagne Massif presents a stratigraphic pattern favorable for oil accumulation near the western edge of the Paris basin even though structural conditions are not so strikingly favorable as in the Aquitaine.

Oil Possibilities Evaluated

Oil and gas seeps have long been known in both the Aquitaine and Rhone Valley basins of southern France, and during the last 5 or 6 years several commercial oil and gas fields have been discovered in the Aquitaine. Until now petroleum has not been found in the Paris basin of northern France. But if we may hazard a guess, this may be due in large part to neglect on the part of the oil hunters.

The lower Albian green sands, in particular, pinch out updip against the Bretagne Massif in a pattern relative to the Paris basin remarkably similar to the way in which the highly productive Woodbine sand pinches out updip from the Tyler basin of East Texas against the Sabine uplift (see Fig. 3). Impermeable Gault shales are known from wells to overlie the highly permeable Green sands in the basin. At the western outcrop, however, both Green sands and Gault shales are overlapped by Upper Cretaceous sands. But if the lower Albian sands pinch out before the upper Albian shales, a stratigraphic trap almost certainly exists.

In spite of such uncertainties, the western part of the Paris basin remains as a region with very attractive lower Cretaceous and Upper Jurassic stratigraphic possibilities certainly deserving exploratory drilling. In the coming months French Government and foreign concerns will undoubtedly show renewed interest in the Paris basin and in other prospective oil areas of France.

Editor's note: Recently, the French Government has actually granted concessions in the Paris basin. Of further interest is the report that live oil showings have been encountered in a government stratigraphic test about 60 miles southeast of Paris. The author has taken this article in part from his unpublished "Cretaceous History of France" (Stanford University, 1952); since 1952 he has been employed as a geologist by Standard Oil Co. of California.

LOUISIANA

NORTH LOUISIANA

Rodney Island Well Gets Good Oil Showing On Test

McCormick-Short-Randolph-Jett 1 J. M. Harper, 12-10n-12e, north outpost to eastern Tensas Parish's Rodney Island field in east-central Louisiana, got a 29-ft. section of Massive sand, showing for production.

The extension well is 1 mile north of the field discovery well. Recovery in the tool was 710 ft. of 38°-gravity pipeline oil and 120 ft. of oil and gas-cut mud on test at 9,226-72 ft.

The discovery well of the field, Heel Oil Co. 1 Magnolia-Learned, 12-10n-12e, flowed 166 bbl. of 39.6°-gravity oil per day through ½-in. choke from perforations at 9,252-60 ft. The well is now shut down.

Pettit Discovery in Longstreet Field, DeSoto

DeSoto Parish's Longstreet field got a good Pettit pay well at Gilster & Kemp 1 Moseley & Garland, 25-14n-16w, in the northern part of the parish, northwestern Louisiana.

The well gaged 29,000 M.c.f. of gas per day and 60 bbl. of 66.5°-gravity condensate per million from the Pettit at 6,335-53 ft. It rated 2,250 M.c.f. of gas per day from the Gloyd at 5,356-70 ft. plus 2 bbl. of 60.6° gravity condensate per million. The producer is 1⅜ miles northwest of Longstreet field proper.

SOUTH LOUISIANA

Deep Flank Test Started At Bayou Bouillon Dome

Exploration is being extended to the untested northwest flank of Bayou Bouillon salt dome, 15 miles northeast of St. Martinsville, in St. Martin Parish, where Sohio Petroleum Co., in a joint venture with Tide Water Associated Oil Co. and R. A. Welch estate, has made location for an 11,000-ft. test.

The new wildcat, 1 Lucie Martin, is more than 1½ miles west of nearest production, found in Pliocene-Miocene sands from 2,500 to 3,500 ft. overlying or closely flanking the dome. Projected depth will permit exploration of Marginulina and Frio horizons.

Bayou Bouillon, a shallow piercement-type salt dome, was discovered in 1902, although first commercial production was not opened until 1928. Its location in the Atchafalaya swamps has made operations extremely difficult.

Wildcat in Old Edna Area Opens New Oil Production

Ada Oil Co. appears virtually assured of a good oil producer in its 1 Powell, a wildcat located north of abandoned production in the old Edna field, northern Jefferson Davis Parish.

During a preliminary drill-stem test of a perforated sand interval at 8,256-61 ft., the well flowed clean oil under pressure of 1,425 psi. The test was made through ¼-in. bottom and ⅛-in. top chokes. Gas was at the top within 45 minutes after the tester was opened, and oil within another hour.

No gage was taken, but operators except the well to be good for more than 200 bbl. per day when tubing is run. Hole was drilled to 8,923 ft. and has casing to 9,360 ft. Production previously had been indicated in sand at 8,171-91 ft.

Edna field was discovered in October 1948. Two producing wells have been drilled. Last reported production was in 1951.

Ada's discovery is on a farmout from Kirby Oil & Gas Co.

Second Pine Bluff Well Opens Deeper Pay Zone

Forest Oil Corp. has completed its 1 Pousson, second well and new-pay discovery in Pine Bluff field, Acadia Parish, with a potential flow of 8,200,000 cu. ft. of gas and 27 bbl. of 47°-gravity condensate per day through 14/64-in. choke with pressure of 7,775 psi.

Production is from casing perforations at 11,788-98 ft. and 11,801-11 ft. Total depth is 11,843 ft.

Location, in 19-9s-1w, is across a fault from the field's discovery well, completed by Sun Oil Co. in July 1953 with pay interval at 11,532-52 ft.

CANADA

Basal Quartz Discovery Reported in Wayne Area

Great Plains Development Co. of Canada, Ltd., and Triad Oil Co., Ltd., have discovered crude oil in the basal quartz formation at their current exploratory driller on farmout from Socony-Vacuum Oil Co. of Canada, Ltd., in the Wayne area of southern Alberta. Thickness of the oil zone has not been determined as yet, nor is the commercial worth of the strike known.

The well, Great Plains-Triad A-6-22 Socony CPR, LSD 6, 22-27-20w4, is about 9½ miles south of Drumheller and 58 miles east-northeast of Calgary. It lies slightly more than 2 miles northwest of the team's Viking gas discovery well in the area and 2¼ miles west-northwest of the Great Plains-Socony 15-13 Wayne capped potential detrital 'wet' gas strike.

The test that indicated discovery, run for a duration of 1 hour, in the basal quartz interval 4,443-79 ft., gas reached the surface in 10 minutes, at maximum rate 76,000 cu. ft. daily, decreasing to a small blow. When pipe was pulled it was found to contain 3,100 ft. of clean oil.

Two subsequent tests, both unofficially, but reliably reported, show the first run of interval 4,477-89 ft. for 2 hours. Gas flowed at maximum rate 175,000 cu. ft. daily, decreasing to zero. Pipe recovery was 440 ft. of oil. The second, a 1-hour test, of interval 4,489-99 ft., showed gas flowing to the surface at maximum rate of 100,000 cu. ft. daily. Recovery on this test was reported as 3,300 ft. of oil. Coring and testing is being continued.

Saskatchewan . . . Medium to light-gravity crude oil has been discovered in what appeatrs to be commercial volume in the Charles member of the Mississippian at a Shell Oil Co. wildcat in the Midale-Huntoon area of southeast Saskatchewan, 30 miles southeast of Weyburn.

The strike, was made at Shell A-8-12 Huntoon, LSD which is 4½ miles due east of Sooner Petroleums' Mississippian oil wells

BLEEDER HOLE
CHARLES WHEATLEY 2" Cast Iron Self-Sealing Plug Valve
600# Test—Fluid on both sides of valve. Bottom flange off.
(This shows that a bleeder can be put in body)
PLUG WITH TOP AND
BOTTOM BEARING
VALVE BODY
ASSEMBLED PLUG VALVE
BOTTOM FLANGE
TWO SELF-SEALING RUBBER CAPS

Non-Lubricating Plug Valves—Iron, Steel, or Bronze: Flanged or Screwed.

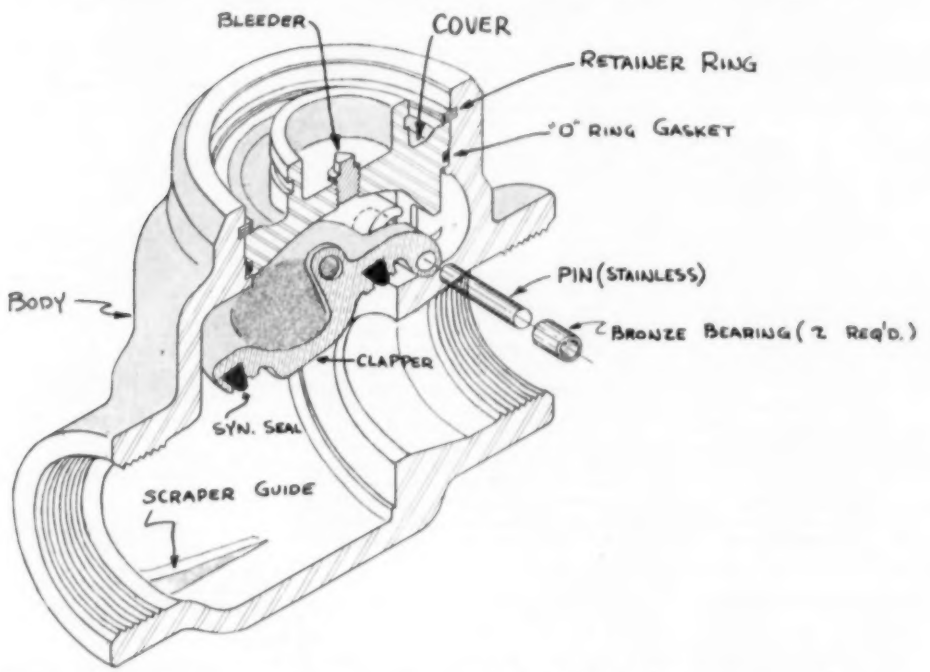
For further information on this Self-Sealing Plug Valve see "What's New in Equipment" Section, this issue.

ONE VALVE REPLACES FOUR

LOWER YOUR CHECK VALVE INVENTORY

With *Streamflo* Swing Check Valve

(Synthetic Seat, Full Opening for Pipeline Scraper)



Comparative Costs: ——————*SAVINGS*——————→

	Approximate Competitive Steel Valve Cost	Streamflo Cost	Savings on Steel Check Valves
Company 'A' purchases from July '53 to Mar. '54	$52,147.13	$18,054.28	$34,092.85
Company 'B' purchases from June '53 to Mar. '54	$37,690.70	$14,253.75	$23,436.95

Comparison on 4" Steel Screwed Check Valves:

Size	Approximate Competitive Cost
230#WP	$118.00
600#WP	138.00
800#WP	177.00
1200#WP	198.00

ONE VALVE COVERS ALL FOUR
Streamflo 1500#WP
Costs only
$69.54

Flange Valves, Series 30, Steel—Approximate Cost of Competitors . . . $145.00 Streamflo . . . $84.50

Quotation from Major Oil Company Letter:

Thank you for your letter of March 26, 1954, relative to our past purchases of Streamflo check valves.

We would like to compliment you and your organization on your aggressiveness and effort to improve a product used in the pipe line industry.

Your analysis of prices paid on Streamflo check valves in comparison to prices we would have paid on other makes of steel check valves is approximately correct. This refers to Company 'B' under Comparative Costs.

Streamflo is available at most Supply Stores

CHARLES WHEATLEY COMPANY
414 SOUTH DETROIT — TULSA, OKLAHOMA

and about 5 miles northeast of the Imperial-Midale oil field.

Drill-stem test from 4,386 to 4,434 ft. for 102 minutes gave a strong steady blow with gas reaching the surface in 55 minutes. Pipe recovery consisted of 1,080 ft. of mud and gas-cut oil and 90 ft. of mud. Gravity of the oil is 28.2°.

Second test released by Shell was from 4,434 to 4,454 ft. for 1 hour. Gas flowed in 57 minutes and recovery was 390 ft. of mud and gas-cut oil and 50 ft. of salt water. Hole is currently bottomed at 4,753 ft.

APPALACHIAN AREA

PENNSYLVANIA

Wildcat drilling activity in Pennsylvania is currently centered on the northwestern flank and environs of the Chestnut Ridge anticlinal trend in Clearfield, Jefferson and Indiana counties.

The southwestern productive limit of Benezette field has been extended into Clearfield County. This field is located on the Driftwood-Benezette anticline an en echelon fold to and northwest of the Chestnut Ridge anticline. This fold merges with the northwestern flank of the Chestnut Ridge anticline in Clearfield County southwest of the proven production in Benezette field.

Eighteen miles southwest of Benezette field production, an Oriskany test is being drilled by the Rockton Drilling Co. in Union Township, Clearfield County.

This test, the 1 Eva Moore, is located 7 miles northeast of an apparent wildcat discovery of F. C. Deemer in Bell Township, Clearfield County. No confirmation wells of this lower Devonian (Oriskany?) production have been completed.

Four miles southwest of the Bell Township discovery, Fairman Drilling Co. is drilling at 5,120 ft. on the 1 Clair Reed Oriskany test in Gaskill Township, Jefferson County.

Fairman Drilling Co. is also drilling at 5,400 ft. on an Oriskany test in Grant Township, Indiana County. This test is located on the Richmond anticline an en echelon fold to and immediately northwest of the Chestnut Ridge anticline. This location, 1 Gernandt, is 12 miles southwest of Fairman's Gaskill Township, Jefferson County location.

Five dry holes have been completed on the Chestnut Ridge anticline in Clearfield County. These dry tests were located near the crest of the structure and encountered a thin calcareous Oriskany sandstone section.

WEST VIRGINIA

In Greenbrier County, Anthony Creek district, West Virginia, United Fuel Gas Co. 1 M. J. Alderman, rank wildcat, elevation 2,041 ft. was dry, Oriskany sand 1,055-1,252 ft., Clifton Forge 1,252-1,310 ft., water at 1,260-1,265 ft., Keener and lime 1,387-1,568 ft. TD 1,651 ft. Glade district, Webster County, Nelson W. Taylor, Agent 1 A. H. Swiger, elevation 2,344 ft., gaged 800,000 cu. ft. gas, Maxon sand 1,539-1,598 ft. TD 1,598 ft. This operator has made location for 1 Leonard H. & Helen E. Arthurs.

OHIO

Short extensions, both north and south to Richfield Oriskany pool, were completed. The D. C. Hubbard 1 L. Parasiliti, Lot 3, Richfield Township, gaged 525,000 cu. ft. natural with no increase after acidizing from sand at 2,162-2,209 ft. The Mar-Vern Gas & Oil Co. 1 Shaw, Lot 5, Bath Township, Summit County, gaged 575,000 cu. ft. natural and 1,150,000 cu. ft. gas and 15 bbl. oil per day after acidizing sand logged at 2,175-2,226 ft.

Mammoth Drilling Co. 4 W. R. Farmer, Section 11, Butler Township, Knox County, a ¼ mile north extension, found the Clinton at 3,111-3,151 ft. with a good showing of oil and gas natural that increased to 346 bbl. oil and 500,000 cu. ft. gas in a 24-hour test after fracturing.

MICHIGAN

New Trenton Pool

Sun Oil Co. had rotary rig on location for the first follow-up test to its 1 Niehaus, SW NE SW 8-3s-4e, Freedom Township wildcat oil discovery, Washtenaw County—Michigan's most recent Trenton discovery well. The first well to be started following this new discovery will be the Sun 1 Buss & Haab Unit, SW SE NW 8-3s-4e, the direct north 40-acre offset to the discovery producer. This test will be drilled all the way with rotary.

Meanwhile, the 1 Niehaus was placed on a regular production schedule and was rated good for about 100 bbl. of oil and from 12 to 24 bbl. of water daily, flowing after acidization with a total of 4,000 gal.

Top of Trenton at this new discovery was logged at 3,771 ft. Hole was drilled to 4,308 ft., total depth, after 1 ft. of good, effective pay was drilled with cable tools at 3,962-63 ft.

The two flowing Trenton oil wells in Northville pool, Washtenaw County, were voluntarily prorated to 200 bbl. each this past week after bottom-hole tests by the Geological Survey Division and recommendations by the division that wells be restricted so as not to produce either in excess of 200 bbl. daily, or more than 1,000 cu. ft. of gas per barrel of oil.

The discovery producer, the W. C. Taggart 1 LeMaster, which has produced in excess of 100,000 bbl. of oil since it was completed early this year, showed a gas-oil ratio, on test, of 734 cu. ft. of gas per barrel of oil, flowing at a rate of 332 bbl. daily.

The Torosian 1 Nerreter, being produced from the deepest Trenton pay in the pool, showed a gas-oil ratio of 545 cu. ft. of gas to a barrel of oil on test at the 200-bbl. flow rate, but flowing pressure at the 1 Nerreter was gaged at 728.4 psi. at a wide open production rate of 315 bbl. daily, while the discovery, at a flow rate of 672 bbl. daily, showed a flowing pressure in excess of approximately 1,760 psi.

The 1 LeMaster is located in the NW SE SE 1-1s-7e, Salem Township, Washtenaw County. The 1 Nerreter, only other flowing well, is located in the SE SE NE 2-1s-7e.

KENTUCKY

WESTERN KENTUCKY

F. H. Rhodes and Charles Morburger 1 Chase, 2 miles north of Reed in 9-Q-26, 1 mile from production in Henderson County, pumped 124 bbl. of oil per day natural. Pay is a 1-ft. section of Waltersburg sand at 1,269-70 ft.

EASTERN KENTUCKY

In Big Sandy gas field and located in the Pike County sector, United Fuel Gas Co. have completed 8235 B. F. Williamson, et al as a dual Devonian black shale and Berea (Mississippian) gas producer. Well gaged from the two zones 280,000 cu. ft. of gas daily after shooting with 6,266 lb. of gelatin. A rock pressure of 545 pounds was recorded in a 48-hour period.

MISSISSIPPI

New Wilcox Area Opened In Wilkinson Discovery

A new Wilcox field appears to have been uncovered in western Wilkinson County, where David Sadler is completing his 1 Kee, a wildcat in 29-3n-4w, on Lake Mary plantation, as an oil producer in sand at 7,645½-50½ ft. The discovery is the second in the county this year.

Testing perforations through drill stem with ⅜-in. bottom and 7/64-in. top chokes, the well flowed at the rate of 108 bbl. of clean oil per day with pressure of 1,100 psi.

Hole had been carried to 7,753 ft. and casing run to 7,717 ft. Showings also had been encountered in zones at 7,445-51 ft. and 7,501-06 ft.

Location is 1½ miles east of Lake Mary, the name adopted for the field. Bateman Drilling Co. already is putting down a northeast offset test, 1 Wilbert.

ILLINOIS

An east offset well will be spudded in September 10 to the rated 1,100-bbl. per day Aux Vases sand well of Roy M. Dooley for Tony Forino and Associates at 1 Asa Lee, NW NW NW 33-1n-5e, Wayne County, about 6 miles southwest of Johnsonville pool.

This new Aux Vases discovery for the old South Orchardville McClosky pool established a record for diamond coring 18 ft. of Aux Vases sand 2,818-36 ft. at 1 and 2 minutes per foot and showed a potential of flowing on the drill-stem test. It flowed 45 bbl. per hour when casing was perforated, filling four 210 tanks and is shut-in for pipeline proration.

In White County C. C. Beebe and Ryan Oil Co. have set casing at 1 Merritt, 5-4s-9e, 3 miles southeast of Liberty and 2 miles from production. Recovery on a McClosky lime drill-stem test at 3,460-64 ft. was 480 ft. of clean oil with no water.

Four miles east of Clay City in Richland County, Paco Petroleum, F. T. Whittinghill and C. S. Higgins 1 Robards, 24-3n-8e, ½-mile west stepout from Clay City Consolidated pool, flowed oil natural from the Rosiclare lime at 2,987-93 ft.

KANSAS

New Pools Named

Names have been given to new Kansas oil and gas pools by the Nomenclature Committee of the Mid-Continent Oil and Gas Association.

Central Kansas uplift . . . Phillips Petroleum Co. 1 Jettit "A", SW SE NW 27-20s-14w, Barton County, opened Jettie field with production from the Simpson.

In Ellis County Southeast Walter pool was opened at 1 Walter, SW SE SE 13-12s-18w, by Birmingham-Bartlett with production from the Arbuckle. Coppinger Drilling Co. 1 Winters, SE SE NW 30-23s-17w, a Misener sand strike, opened Southwest Garfield pool in Pawnee County. Sterling Drilling Co. 1 Elliott, NW SW SE 31-27s-13w, Pratt County, opened South Fitzsimmons pool with production from the Simpson.

Stafford County has two new pools, Sutton,

opened by Natural Gas & Oil Corp. and Amerada Petroleum Corp. 1 Sutton "A", SW NE SW 21-22s-14w, a Lansing producer; and Mopac pool, opened by Cooperative Refinery Association 1 McMillan "A", SW NE NW 30-24s-11w, a Viola producer.

South Kansas . . . In Barber County Southwest Medicine Lodge pool was opened by Imperial Drilling Co. at 1 Ott "A", SE NW SW 6-34s-13w. It gaged 1,846 M.c.f. of gas per day from the Mississippi.

Harper County has two new pools. West Grabs pool was opened at 1 Morris, SE SE SE 14-31s-9w, as a Mississippian producer, by Berwick Drilling Co. Musgrove Petroleum Co. opened Banner pool at 1 Mollenhauer, SW SW SW 27-32s-7w, with production from the Simpson.

Salina basin . . . Ash Grove pool was opened in Dickinson County at Don Ingling 1 Wilson "A", SW SW SW 5-15s-1e, finaled for 25 bbl. of oil per day from the Mississippian.

West flank of uplift . . . Northeast Aldrich pool was opened in Ness County by Barnett Oil Co. 1 Shearer, SW SW SE 23-17s-25w. Completion was 66 bbl. of oil per day from the Mississippian.

Hugoton area . . . In Meade County Ohio Oil Co. 1 Bond, NW NW SE 32-33s-30w, opened Bond pool with production from the Atoka.

OKLAHOMA

Deep Holes Quit

Southeastern Oklahoma got two deep holes abandoned recently, one in Coal County, the other in Pittsburg County.

Pasotex Petroleum and Anderson-Prichard Oil Corp. 1 Underhill, C SE SW 26-1n-11e, the deepest current test in Oklahoma, went to total depth of 15,675 ft. Recently the well got some gas up the hole.

Magnolia Petroleum Co. 1 Manschreck, C SE NE 28-6n-17e, Pittsburg County, went to 12,915 ft. and was dry and abandoned. Testing was unsuccessful at this deep wildcat.

Blakely Pool Gets Big Booch Sand Awakening

Eastern Okfuskee County's Blakely pool has a revival of Booch sand production. Gibralter Oil Co. 1 Burnett, SW SE SE 35-12n-10e, flowed 40 bbl. of new oil per hour following fracturing of the Booch sand at 2,590-2,630 ft.

Booch production was opened in the area a decade ago by W. C. McBride, Inc. There is no current Booch production within 2 miles of the new discovery.

Mississippi Shows to Be Tested at Woods Prospect

Mississippian shows will be tested at J. R. McDermott 1 Iva Murrows, SW NE 19-27n-16w, Woods County, northwestern Oklahoma.

The Mississippian was topped at 5,747 ft. Drill-stem test at 5,750-78 ft. flowed 8,000 M.c.f. of gas per day and recovered 4½ ft. of distillate. Some gas flowed on a deeper test at 5,779-5,817 ft. Recovery was 65 ft. of slightly oil-cut mud. Recovery on a drill-stem test in the Simpson at 6,979-89 ft. was 75 ft. of highly gas-cut salt water.

TEXAS

WEST TEXAS

Yoakum County Discovery Makes High Potential

Hunt Oil Co. has completed its 1 Johnson as a Devonian discovery, for a daily potential of 553 bbl. of 37° oil, through ¼-in. choke, from casing perforations between 11,438-11,475 ft. Gas-oil ratio was 50 cu. ft. and flowing tubing pressure was 300 psi.

Loaction of the discovery is in a new area, 10 miles southwest of the town of Plains and about the same distance southeast of Devonian production in Bronco field.

Northeastern Yoakum County gained a Devonian wildcat, with projected depth to 12,600 ft. Felmont Oil Corp. and others have made location for 1 M. Taylor in SW NE of Section 202, Block D, Gibson Survey. Location is 3 miles northwest of Prentice field.

Texas Pacific Coal & Oil Co. 55 Bennett, deep exploration on the east side of Bennett portion of Wasson field planned to plug back and complete in the Clear Fork which showed oil while drilling, from 7,789-8,291 ft. Total depth was 10,214 ft., believed to have been in the Wolfcamp.

Midland County . . . Forest Oil Corp. and Cities Service Oil Co. 1-B Dora Roberts, northernmost test in the block, and 4 miles south of Headlee field, reported shows of oil in the Devonian.

Sample top on the Devonian was 11,200 ft., minus 8,347 ft. A 2-hour drill-stem test from 11,295-11,464 ft. had gas in 37 minutes and recovered 470 ft. of gas-cut mud plus 180 ft. of heavily gas and slightly oil-cut mud, and 270 ft. of heavily oil and gas-cut mud.

South of Headlee field, British-American Oil Producing Co. 1 Roy Parks was running casing for completion in the Ellenburger. Total depth was 13,357 ft. and final drill-stem test from 13,246-13,357 ft. developed the water blanket and only slightly gas-cut mud. Two tests above that section had flowing oil, and total pay section indicated was around 300 ft. Tide Water Associated Oil Co. has staked a north offset as 1 Roy Parks.

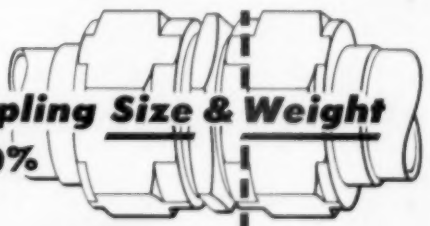
TEXAS GULF COAST

Gas-Condensate Found in Deeper Sand at Garwood

Open-flow potential of Christi, Mitchell & Mitchell's new deep-pay discovery well, 2 Bass, in the Garwood area, Colorado County, is rated at 7,250,000 cu. ft. of gas per day with condensate recovery in the ratio of 49,000 cu. ft. of gas per barrel of liquid. Producing section is perforated in a series of intervals from 8,625 to 8,712 ft. Total depth is 10,304 ft. Nearest well, ½ mile to the southwest, produces dry gas from Miocene sand at 1,990-2,010 ft.

Fifth Milton Well Moves Production Farther East

Production of Milton field, north of North Houston, Harris County, is being extended eastward by J. S. Abercrombie at his 1



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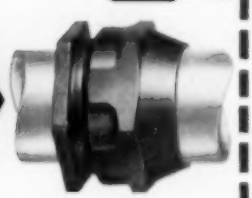

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Weisenberger, testing the field's Yegua pay with perforations at 6,705-07 ft.

The well will be the fifth for the field, discovered last November by J. M. Huber Corp. and Columbian Fuel Co. While cleaning through 6/64-in. choke, flow was at the rate of 60 bbl. of 38.6°-gravity oil per day with gas-oil ratio of 1,850 cu. ft. per barrel.

Loaction is approximately 1,750 ft. from nearest producer.

NORTH TEXAS

Jack County Confirmation Well High on Bryson Sand

Triad Drilling Co. 2 Ed G. Steward, second attempt in the new Triad field 7 miles southeast of the town of Antelope, has had two successful drill-stem tests and was reported running 15 ft. high to the discovery well.

Top of Bryson sand was called at 3,680 ft. in 2 Steward. First drill-stem test, identified as the upper zone, from 3,681-90 ft., recovered 3,600 ft. of free oil plus 30 ft. of heavily oil and gas-cut mud in 1½ hours. Gas surfaced in 10 minutes but volume was not estimated.

Second test, in the lower zone, from 3,728-37 ft., had gas in 14 minutes and recovered 2,030 ft. of free oil plus 180 ft. of oil-cut mud. Operators planned to core ahead before making completion.

Haskell County new pay . . . Continental Oil Co. 2-A Bettis, northwest stepout to the company's Strawn discovery, has indicated production from the KMA sand. On a 1-hour drill-stem test between 4,766-85 ft. gas surfaced in 4 minutes and recovery was 2,610 ft. of oil and 90 ft. of heavily oil and gas-cut mud.

Fisher County . . . Youngblood and Youngblood 1 Humphries, Ellenburger wildcat 4 miles east of Sylvester, reported 90 ft. of oil and a good flow of gas on a drill-stem test of the Ellenburger between 5,957-75 ft. Total depth is 6,150 ft.

New projects scheduled in Fisher County included a 7,000-ft. operation by A. V. Jones & Sons, Albany, as 1 S. E. Rains. Location is in Section 280, Block 2, H&TC Survey. Trans-Tex Drilling Co., Longview, will drill 1 J. Ubben to 6,000 ft., in Tract 3, League 314, K. K. Rector Subdivision of the Bastrop County School Land Survey. Location is 3 miles northeast of Roby.

SOUTHWEST TEXAS

Fifth Pay Zone Opened In Mills Bennett Field

Another pay zone has been proved productive in Mills Bennett field, Brooks County, where Mills Bennett Estate is completing its 10 Fee as an oil well in sand at 3,820-28 ft. No estimate of productivity has been reported.

The new pay is the fifth and shallowest in the field. Other productive zones are at 4,440 ft., 4,680 ft., 4,700 ft., and 5,230 ft. Eight wells and one dry hole have been completed.

New Oil-Discovery Well Completed on King Ranch

Another oil discovery has been chalked up by Humble Oil & Refining Co. on its vast King Ranch holdings in the lower coastal area of Southwest Texas.

Location is a rank wildcat, 2 King Ranch-Alazan, 28 miles east-southeast of Kingsville,

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Kleberg County. It is near Alazan Bay, about 20 miles inland from the Gulf of Mexico.

Initial flow was at the rate of 27 bbl. of 47.3°-gravity oil per day through ½-in. choke with 1,000-psi. pressure and gas-oil ratio of 8,660 cu. ft. per barrel.

Nearest production is a gas-condensate well completed last year by The Texas Co. about 8 miles to the southwest, and designated as del Grullo field.

Stillwell Sand Produces In New Jim Wells Field

Southwest Workover, Inc., has completed its 1 Perkins, wildcat in Lavaca Survey, 3 miles west of Alice, in Jim Wells County, as a new field discovery well in Stillwell sand. Completion was on the pump making 133.35 bbl. of 41°-gravity oil per day. Pay is perforated at 4,597-4,612 ft.

Confirmation of the discovery is indicated in a northeast offset test, 1 Polk, drilled by L. M. Lockhart, which flowed oil in a drill-stem test of the pay at 4,600-07 ft.

The area is designated tentatively as Perkins field.

New Chalk Field Opened

Discovery of a new Austin Chalk field, located 13 miles southwest of Pearsall, in Frio County, has been made by M. L. Wise, whose 1 Alfred Keller, wildcat in BBB&CRR Survey, flowed 186 bbl. of 33°-gravity oil daily through 9/64-in. choke from pay in open hole at 5,570-5,862 ft. Flow was with 425-psi. pressure on the tubing, and followed a 5,000-gal. acid treatment.

CALIFORNIA

Drilling Stops At Island Well

Monterey Oil Co. has completed drilling its island-located test, 3 Monterey-Texas-State, 1½ miles offshore from Seal Beach, Orange County. Well was bottomed at 10,162 ft., but since this is a no-dope hole a report that casing was being run was unconfirmed.

Of interest in connection with this test is a well drilled in 1948 by Marine Exploration Co. and slant drilled from shore at Seal Beach to a point a little short of the location of the new well. The former was completed for 75 bbl. a day of 26°-gravity oil from the Ford zone, productive in the Wilmington field. It was slant drilled a total distance of 12,130 ft. to a reported vertical depth of about 5,000 ft.

La Habra Wildcat Idle

Outlook for Erin Oil Co.'s 1 Freedman-North La Habra wildcat, NE 5-3e-10w, Los Angeles County, is unfavorable in view of repeated failures to obtain a water shutoff. Operations have been suspended while operator considers best course to pursue.

Santos Creek Test

Drilling & Production Co. has cemented surface casing in its Santos Creek Point of Rocks test, 71-32 Trico, in the Santos Creek area, NE 32-28s-20e, Kern County. The location is ½ mile north of Norris Oil Co.'s CCMO 86X, abandoned last January, which had showings of 36°-40°-gravity oil in Point of Rocks interval 3,630-53 ft. Trico Oil & Gas Co., Norris Oil Co., and Intex Oil Co. are interested with the operator in this test.

Beverly Hills Second Well Completed

Universal Consolidated Oil Co. has completed its second producer in the new deep zone which it discovered on its 260-acre 20th Century-Fox lease in Beverly Hills oil field last February. On a short test, the new well flowed at the rate of 750 bbl. a day of 24°-gravity oil and 300,000 cu. ft. of gas through a 20/64-in. choke. Both producers are shut in pending the completion of tankage and pipeline facilities. A third well will be slant drilled from the same site from which the first and second wells were drilled. The new start will be delayed until recently purchased electrical equipment can be installed.

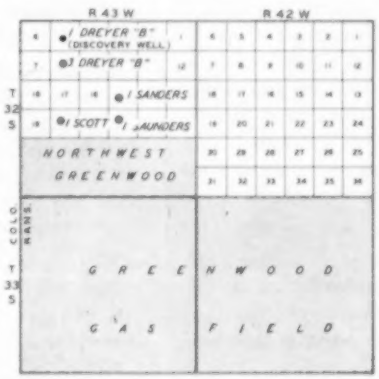
HUGOTON EMBAYMENT

Link-Up Near For Morton's Dreyer and Greenwood Fields

A link-up for Northwest Greenwood pool and newly-discovered Dreyer pool in southwestern Kansas' Morton County appears imminent.

Colorado Oil & Gas Co. 1 Dreyer "B," NE NE SW 5-32s-43w, opened Dreyer pool earlier this year with a gas flow of 4,500 M.c.f. per day from Topeka lime perforations at 2,966 ft. The south offset, 3 Dreyer "B," SE SE NW 8, is at total depth 3,425 ft. Perforations are at 2,974-3,107 ft. Testing is under way.

In Sections 15, NE NE SW, Colorado 1 Sanders is drilling below 2,700 ft. The 1 Scott, SE SE NW 20, is testing at total depth of 3,375 ft. The 1 Saunders, SE SE NW 22, flowed 19,800 M.c.f. of gas per day.



Greenwood's scope . . . Greenwood field now covers a huge area of Morton County. The following field description includes the Waubaunsee, Shawnee, and Lansing-Kansas City producing horizons.

In 32s-43w . . . Sections 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, and 36. All 36 sections in 33s-42w; all 36 sections in 33s-43w; Sections 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17, 18, 19, 20, 21, and 22 in 34s-42w; Sections 4, 5, 6, 7, 8, 9, 16, 17, 18, 19, 20, 21, 28, 29, 30, 31, 32, and 33 in 34s-43w.

Beaver Morrow Discovery Has Extension Assured

The Texas Co. 1 Barby "A," Beaver County gas strike of recent months, has a 2-mile northeast Morrow gas extension assured at United Producing Co. 1 Barby, NE SW 36-5n-25eCM, 12 miles northeast of Beaver, Okla.

The well is testing after flowing an estimated 10,000 M.c.f. of gas daily through tubing. Morrow sand perforations are at 6,894-6,920 ft. The discovery well of the area, Texas 1 Barby "A," NW NW 2-4n-25eCM, 10 miles northeast of Beaver and 4 miles southwest of Northwest Knowles field, flowed 6,000 M.c.f. of gas daily from perforations in the Morrow sand at 6,752-86 ft.

Oklahoma Hugoton Field Gets First Oil Well

The Oklahoma Panhandle portion of the Hugoton gas field has its first oil production at a small Marmaton-Pennsylvanian discovery in Texas County.

The pool opener, inside Permian production of Hugoton gas field, is Oceanic Oil Co. 1-A Swinger, C NW NE 5-5n-16eCM. Swabbing recovered 18 bbl. of oil in 5 hours, 90 per cent oil. Perforations at 5,360-62 and 5,369-71 ft. got 21 bbl. of oil in 9 hours natural.

ROCKY MOUNTAIN

WYOMING

Big Horn Deep Test Finds Phosphoria Oil

Sun Oil Co. recovered free oil and oil and gas-cut mud on test of Phosphoria at 1 Ralston Unit, C NE SW Tract 51, 56n-101w, Park County. The well is a scheduled 13,000-ft. Madison test and is being deepened from third Frontier where it was completed as a discovery in 1953. The well was completed for 200 bbl. of oil daily from the interval 10,117-10,135 ft. It is now being continued to the original objective, after production from Frontier declined decidedly.

Sun tested the zone 12,650-12,710 ft., and with tool open 2 hours, recovered 800 ft. of high-gravity oil, 1,200 ft. of oil and gas-cut mud and 2,000 ft. of oil and gas-cut water cushion. Flowing pressure was 925 psi. Shut in pressure was 5,600 psi. The operator is reported coring below 12,710 ft.

The wildcat is southwest of Elk Basin, where substantial Madison production is important. If it is continued to the Madison objective, production from Tensleep is also a possibility.

Neiber Dome Wildcat Recovers Tensleep Oil

The California Co. recovered 2,100 ft. of mud and gas-cut oil, and 200 ft. of oil and gas-cut mud on test of the Tensleep interval 10,519-10,545 ft. at 8 Neiber Dome Unit, NW NW NE 30-45n-91w, Washakie County. The wildcat is about 5 miles southeast of Phosphoria production in Neiber field. Tool was open for 2 hours with flowing pressure 1,940 psi.

An earlier test 1-0,475-10,504 ft. recovered 150 ft. of oil and 350 ft. of highly oil and gas-cut mud. Top of Tensleep was found at

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CONTINUOUS BUTT WELD

10,489 ft. California is now running logs with the well bottomed at 10,545 ft.

Two Natrona County Wildcats Awaiting Tests

Forest Oil Co. has landed production string at 1 Morton 22-1, NE SE NW 22-32n-85w, in the Grieve Unit, Natrona County. The wildcat, 35 miles west of Casper flowed at rates up to 1,440 bbl. per day on drill-stem test of a sand still identified only as "Cretaceous." Casing was landed at 7,286 ft. Total depth is 7,288 ft.

In the northern part of the county, Natural Gas & Oil Corp. and McElroy Ranch Co. have run casing to 3,931 ft. to test shows found in Lakota at 1 Shannon-Midwest-Government, SW NE SW 1-40n-79w. The operators reported good sand in cores of Lakota, but had no encouragement from drill-stem tests.

NORTH DAKOTA

Stark County Wildcat Recovers Oil

Amerada Petroleum Corp. recovered 48 bbl. of oil and 20 bbl. of water on drill-stem test at 1 Newton, NW SW 31-140n-99w, Stark County. The well is about 5 miles east and slightly north of Fryburg field. The recovery was from the "Fryburg" sand which produces in one well in Fryburg field. Test was of the interval 8,254-66 ft., and tool was open for 4 hours. The operator is running drill-stem test at 8,356 ft., presumably in the Madison at that depth. No tops have been reported.

Billings County Wildcat Fails in Madison

Stanolind Oil & Gas Co. recovered salt water with a rainbow of oil at 1 Northwestern Improvement, SE SE 17-143n-100w, Billings County. Test was of the zone 9,590-9,620 ft. This zone was squeezed, and casing reperforated at 9,540-70 ft., and swabbing again recovered salt water with only small amounts of oil. Stanolind will now plug back to test Minnelusa at about 8,126 ft.

MONTANA

Teton County Wildcat Staked

Mule Creek Oil Co. of Billings has made location for a wildcat in Teton County, in an area where little previous driling has been done. The well is 1 Hutterite, SW SW SE 23-27n-7w.

COLORADO

Morgan County Discovery Completed

Stanolind Oil & Gas Co. has completed 1 State, C SE SE 16-3n-59w, Morgan County, for a flow of 1,560,000 cu. ft. of gas per day. The well produces from D sand. It is west of gas production in Vallery field, a 1954 discovery.

Twin Buttes Outpost Completed

El Paso Natural Gas Co. has completed 4 Twin Buttes, E½ NW NE 13-5s-102w in Garfield County for a flow of 8,100,000 cu. ft.

(Continued on page 195)

NEW MEXICO

SOUTHEASTERN NEW MEXICO

Eddy County Wildcat Has Gas-Distillate Shows

Great Western Drilling Co. 1 Grayburg, 18-17s-30e, deep test in Premier field, has had shows of oil, plus gas and distillate in the Pennsylvanian. A drill-stem test identified as upper Pennsylvanian, from 9,558-84 ft., recovered 300 ft. of 36° oil with no water. A test from 11,035-11,085 ft., in basal Pennsylvanian, had gas in 3 minutes and a spray of distillate in 10 minutes. Gas volume was 14,000 M.c.f. per day and flowing pressure ranged from 2,450-3,175 psi. Recovery in the pipe was 180 ft. of distillate.

INDIANA

In Spencer County Mulzer Bros. 1 Oskins, 13-5s-6w, more than 8 miles from other Cypress production and in a 2-mile remote area, was completed for 22 bbl. of oil from the Cypress sand at 1,033-44 ft.

WILDCAT COMPLETIONS

SOUTHWEST TEXAS
District 1

Atascosa County: Precision Prospecting Co. 2 Temple, S. Malone Sur. 1069. Dry. TD 1,580 ft.

Frio County: Drilling & Exploration, Inc., 1 Woodward, H&GN Sur. 437. IPP 162 BOPD, 28°, Austin chalk 5,520-5,899 ft. (open hole). TD 5,899 ft. (New field).

Gonzales County: Producers Corp. of Nevada et al 1 Steiner, Samuel McCoy Sur. A-340. Dry. TD 2,225 ft.

Medina County: Bennie A. Meyer 1 Bendele, J. Roche Sur. 908. Dry. TD 1,440 ft.

Milam County: Ralph Fuller 1 Barber, James Hannum Sur., A-195. Dry. TD 2,702 ft.

Wilson County: Morris Cannan and Robert B. Mebane 1 Flate, V. Y'Barbo Sur., A-461. Temporarily abandoned. TD 3,155 ft. (Pumped 3 bbl. net oil per day.)

District 4

Duval County: E. J. Pearl 1 Peters, GB&CNG Sur. 31. Dry. TD 1,800 ft.

Bridwell Oil Co. 1 Peters, T. A. Cavitt Sur. 194, A-1705. Dry. TD 3,778 ft.

Bridwell Oil Co. 2 Peters, GB&CNG Sur. 31, A-725. Dry. TD 2,974 ft.

Holly Development Co. 2 Duwel, Survey 98, A-1712. Dry. TD 4,880 ft.

Hidalgo County: Argo Oil Corp. and George H. Coates 1 Guerra, Tract 11, Share B, Parcel 3, San Salvador del Tule Grant. Dry. TD 11,000 ft.

Jim Wells County: Deep Rock Oil Corp. 1 Reynolds et al, J. Poitevent Sur. 203, A-369. Dry. TD 5,793 ft.

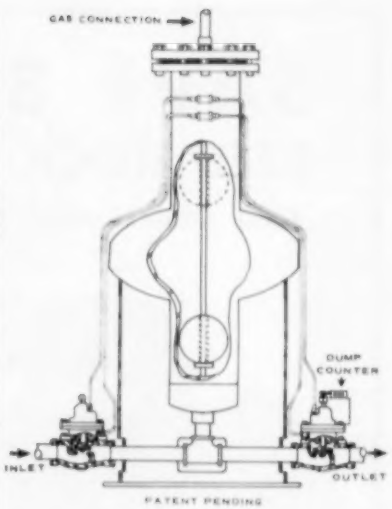
Kenedy County: Humble Oil & Refining Co. 5 Armstrong, Barreta Grant, A-13. Shut-in gas well, no gage, perforations 11,190-202 ft. TD 12,002 ft. (New field.)

Sun Oil Co. 1018-1 State-Gulf, Tract 1018, Gulf of Mexico (surface location on Dunn-McCampbell fee, Padre Island). Dry. TD 9,209 ft.

Nueces County: Gulf Oil Corp. 1 State 33099, State Tract 47, Corpus Christi Bay. Dry. TD 6,625 ft.

O. W. Killam 1 W. E. Pope est., Rincon Peninsula. Dry. TD 8,011 ft.

San Patricio County: Sun Oil Co. 2 Brough-



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Gas and sand will not affect the new meter any more than they would affect normal control valves in oil lines. The meter actually dumps a positive calibrated dump each time. It may be installed on existing heater-treaters, vertical or horizontal separators. The Rolocheck meter eliminates liquid level controls on the separator as it actually controls the liquid level in the vessel.

OPERATION

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(2) Dumping: When float hits upper stop, pilot trips to open outlet valve and close inlet valve simultaneously.

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TYPE	RM1-24
WORKING PRESSURE	150PSI
CAPACITY B.P.D.	MIN. -0. MAX. -1440*
HEIGHT	4'-6"
WIDTH	2'-0"
WEIGHT	356 LBS.
GAS CONNECTION	1"
OIL OUTLET	1½"
OIL INLET	1½"

*At 12 psi. pressure differential. Available with 2" valves for greater capacity.

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WILDCAT COMPLETIONS

ton, W. W. Smith Sur. Dry. TD 1,149 ft.
Starr County: Bass & Vessels 1-A Zarsky, Porcion 82. Dry. TD 1,728 ft.

TEXAS GULF COAST

District 2

Goliad County: H. H. Howell et al 1 Albrecht, Vincente Ramos Sur., A-243. Dry. TD 4,180 ft.
Jackson County: Fourth M. E. Andrews, Ltd., 1 Gayle, Nester Clay Sur., A-13. Dry. TD 6,318 ft.
Live Oak County: S. H. Howell et al 1 Freeman, P. Salinas Sur. 10, A-419. Dry. TD 5,516 ft.

District 3

Brazoria County: E. Cockrell, Jr., et al 1-A Moller, T. W. Grayson Sur., A-196. Dry. TD 8,380 ft. (Stratton Ridge area.)
Harris County: I. Rauch, trustee, 23 House, Mary Owens Sur. IP 178 BOPD, 14/64-in., 35.8°, perforations 4,252-58 ft. TD 4,364 ft. (New pay in Humble field.)
Albert Plummer and J. M. Huber Corp. 1 Kothman, John Jones Sur., A-481. Dry. TD 7,307 ft.
Lee County: F. C. Albright 2 Brade, Alfred White Sur., A-343 (McDade area). Dry. TD 3,004 ft.
Liberty County: Richard Eaton 1 Abel, Mary E. Howth Sur., A-479. Temporarily abandoned. TD 1,137 ft.
L. D. Hindman 1 Pickett et al, Jose Dolores Martinez Sur., A-68 (Davis Hill). Dry. TD 1,750 ft.
Montgomery County: S. E. Brown, trustee, et al 1 Etheridge et al, John Toops Sur. Dry. TD 6,490 ft.
Newton County: Houston Oil Co. and American Republics Corp. 2 Kurth et al, F. Stover Sur., A-407. Dry. TD 7,519 ft.
Orange County: Humble Oil & Refining Co. 1 Stark, T&NO Sur., A-197. Dry. TD 8,200 ft.
Tyler County: Humble Oil & Refining Co. 4-C Kirby, I. J. Hester-T&NO Sur., A-1013 (Hicksbaugh area). Dry. TD 9,359 ft.
Wharton County: Nelson B. Hunt 2 Kelly est., WCRR Sur. 32, A-470. Dry. TD 5,500 ft.

EAST TEXAS

Cass County: F. R. Jackson 1 The Texas Co.-Berry Davis, B. W. Hopson Sur., A-541, 1 mi. W Kildare field. IPP 180.86 BOPD, 43°, GOR 589 cu. ft., Pettit 6,668 ft. TD 6,678 ft.
Cherokee County: Striker Oil Co. 1 Bond & DeLoach, Perry Reese Sur., A-727. Dry. TD 3,735 ft.
Watburn Oil Co. 1 McGowen, Thos. Quevado Sur., A-44. Dry. TD 4,771 ft.
Freestone County: William D. McBee 4 Settlemyre, Wm. Peman Sur., A-831. Dry. TD 2,350 ft.
Henderson County: DeKalb Agricultural Association 1 Lawrence, George Wilson Sur., A-817. Dry. TD 5,177 ft.
Shelby County: DeKalb Agricultural Association 1 Pickering Lumber Co., W. J. Crane Sur., A-95. Dry. TD 7,204 ft.

TEXAS PANHANDLE

Carson County: Pure Oil Co. 1 Read, B-4-26, H&GN. Dry. TD 7,000 ft.

WEST CENTRAL TEXAS

Callahan County: Axelson & Carlson 1-D Hatchett, Sec. 19, D&DA Sur. Dry. TD 1,300 ft.
Bridwell Oil Co. 1 Klepper, Sec. 73, BBB&C Sur. Dry. TD 3,915 ft.
Lee & Demont 1 Mauldin, Sub. 18, Victoria CSL, Sur. 337. Dry. TD 2,520 ft.
L. H. Wilson 1 H. P. Moon, James Drake Sur. 780. Dry. TD 3,346 ft.
Coleman County: Paul E. Berry 1 Knox, A. C. Harrison Sur. 145. Dry. TD 2,942 ft.
Rogers & Thomas 1 Amor, 32-2-T&NO. Dry. TD 3,943 ft.
Gary Wright 1 Blair, 20-1-GH&H. Dry. TD 2,952 ft.
Gary Wright 3 Blair, 20-1-GH&H. Dry. TD 2,813 ft.
Haskell County: Noel Pautsky 1-B Kleinrer, M. Butler Sur. 59, A-12. Dry. TD 5,012 ft.
Sojourner Drilling Co. 1 Cox, Sec. 33, Harmon Spinks Sur. Dry. TD 5,130 ft.
Jones County: Sojourner Drilling 1 Agee, 44-1-D&DA. Dry. TD 2,465 ft.
Sojourner Drilling 1 Bumpass, Sec. 207, G. Martinez Sur. Dry. TD 3,203 ft.
L. H. Wilson 1 Shotwell, J. McGrew Sur. 245. Dry. TD 3,007 ft.
Palo Pinto County: Jack Clement 1 Conger, L. B. Dalton Sur., A-153. Dry. TD 1,332 ft.
Shackelford County: Dewitt McKinley 2 Snyder, Sec. 66, LAL Sur. Dry. TD 590 ft.
Stephens County: D. W. Varel 2-A Lassiter, 67-4-T&P, ½ mi. S Caddo. IP 120 BOPD, 13/64-in., 40°, TP 100 psi., GOR 250 cu. ft., perforated lower Strawn 2,928-36 ft. TD 3,730 ft.
Taylor County: French M. Robertson and L. G Rhodes 1 Parker, Lot 1, J. McSherry Lge. 129. Dry. TD 2,450 ft.
E. L. Wilson 1 Kenner, Sec. 83, L. Bowerman Sur. Dry. TD 1,795 ft.

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WILDCAT COMPLETIONS

Throckmorton County: Warren Petroleum Corp. 1 Greathouse, Sec. 2146, TE&L Sur., A-556, 10 mi. E Throckmorton. IP 127 BOPD, 32/64-in., 41°, TP 375 psi., GOR 1,850 cu. ft., Mississippian 4,644-71 ft. TD 4,671 ft.

J. D. Wrather Jr. and P-M Drilling Co. 1 Speth, Sec. 3024, TE&L Sur. Dry. TD 3,609 ft.

NORTH TEXAS

Archer County: M. J. Frances 1 Ray, Blk. 149, Harris Subd. Dry. TD 1,444 ft.

Sinclair Oil & Gas Co. 1 Ream, Blk. 103, John Harris Subd. Dry. TD 1,585 ft.

Woodson Oil Co. 1-B Hayter, Blk. 2421, TE&L Sur., 2 mi. SW Bishop field. IPP 143 BOPD, 44°, GOR 275 cu. ft., Mississippian 5,282-5,314 ft. TD 5,314 ft.

Baylor County: Staley Oil Co. 1 Butler, 3-1-D&W. Dry. TD 1,701 ft.

Y-B Drilling Co. 1 Young, TE&L Sur. 2426, A-1674. Dry. TD 1,419 ft.

Y-B Drilling 3-B Young, TE&L Sur. 2426, A-1674. Dry. TD 1,418 ft.

Cooke County: Felderhoff Bros. & O. C. Combs 1 Ramsey, B. Lusk Sur., A-569. Dry. TD 2,119 ft.

Montague County: Continental Oil Co. 70 Howard "ABC", John Chambliss Sur., A-123. IPP 48 BOPD, 23°, pay 835 ft. TD 842 ft.

Wilbarger County: J. O. Hancock 1-D Waggoner, 2-4-H&TC. Dry. TD 2,510 ft.

Young County: O. P. Leonard 1-A Mary Taylor, B. Kramer Sur., A-168. IP 200 BOPD, 6/64-in., 40°, TP 600 psi., GOR 1,000 cu. ft., pay 3,080-87 ft. TD 3,200 ft.

NORTHERN NEW MEXICO

San Juan County, South Ute Mountain: Continental Oil Co. 1 Southern Ute Mountain, NW NE NW 26-32n-20w. Dry. TD 8,021 ft.

San Miguel County, East Las Vegas: Continental 1 Hunker, C SE NW 36-16n-17e. Dry. TD 2,429 ft. granite 2,366 ft.

SOUTHEASTERN NEW MEXICO

Lea County: Hudson & Hudson 1 Amerada-State, 35-21s-33e. Dry. TD 3,620 ft.

Wilshire Oil Co. of Texas 12-30 Federal, 30-20s-39e. IP 291 BOPD, ¾-in., pay 7,248 ft. TD 9,680 ft.

WEST TEXAS

Borden County: Gulf Oil Corp. 1-E Higginbotham, 18-31-T3N-T&P. Dry. TD 8,080 ft. Elev. 2,423 ft., reef 8,035 ft.

Panuco Oil Leases, Inc. 1 Sims, 481-97-H&TC. Dry. TD 8,460 ft. Elev. 2,585 ft., Ellenburger 8,378 ft.

Crane County: Brown & Thorp Oil Co. 1 Cordova-Union, 39-35-H&TC. Dry. TD 3,313 ft.

Texas Pacific Coal & Oil Co. 1-A Adams Farm, 8-B24-PSL, 12 mi. N Crane. IP 196 BOPD, 28/64-in., TP 60 psi., GOR 496 cu. ft., 38°, pay 7,890-7,990 ft. TD 12,013 ft.

Crockett County: Reynolds Mining Corp. 1 Harris, 5-3-WCRR. Dry. TD 10,120 ft.

Dawson County: Vega Corp. 1 Glen Pool, 123-M-EL&RR. Dry. TD 8,610 ft. Elev. 3,186 ft., Wolfcamp reef 8,562 ft.

Ector County: Phillips Petroleum Co. 1 Stockton, 17-45-T2S-T&P. Dry. TD 11,440 ft. Elev. 3,007 ft., Pennsylvanian 8,002 ft., Devonian 9,026 ft., Ellenburger 11,371 ft.

Garza County: Cecil Oil Corp. 1 Reed, 117-5-H&GN. IPP 171 BOPD, 40°, GOR 230 cu. ft., pay 2,515-25 ft. TD 2,530 ft.

Continental Oil Co. 1-A Swenson, 5-7-H&GN. Dry. TD 8,155 ft. Elev. 2,366 ft., Strawn 7,286 ft., Mississippian 7,802 ft., Ellenburger 8,090 ft.

Kent County: Warren Petroleum and R. S. Lytle 1 Stewart, Sec. 2079, John Rodman Sur. IPP 84.8 BOPD, 37°, GOR 183 cu. ft., pay 6,036-44 ft. TD 6,104 ft.

McCulloch County: F. H. Carpenter 1-A McCollum, Ernest Gwene Sur. 957. Dry. TD 2,552 ft.

Reeves County: Ken Regan 1 Ballinger, 16-56-T3-T&P, 8 mi. SE Orla. IP 129.8 BOPD, ½-in., 36°, GOR 600 cu. ft., TP 50 psi., pay 5,500 ft., TD 5,550 ft.

Tom Green County: Bridwell, Perkins and Prothro 4 Kennemer, 3-16-H&TC. Dry. TD 3,504 ft.

G. M. Cone 1 Johnson, Sec. 18-17, Daniel Chandler Sur. Dry. TD 5,342 ft.

P. Q. Echols 1-C Funk, 38-5-H&TC. Dry. TD 958 ft.

Humble Oil & Refining Co. 1 Jones, J. C. Long Sur. 92. Dry. TD 7,015 ft. Elev. 2,029 ft., Strawn 5,336 ft., Ellenburger 6,528 ft.

Sid Katz 1 Johnson, J. M. Swishen Sur. 79½, A-7954. Dry. TD 6,500 ft. Elev. 2,117 ft., Ellenburger 6,213 ft.

H. Bryan Poff 1 Holfman, Sec. 153, SPRR Sur. Dry. TD 4,700 ft. Elev. 1,970 ft., Strawn 4,629 ft.

Woodward & Co. 1 Johnson, Joseph Jackson Sur. 2. Dry. TD 6,350 ft.

Upton County: Gulf Oil Corp. 1-AE TXL, 31-42-T5S-T&P, 8 mi. NE Crane. Devonian IP 246 BOPD, 18/64-in., 52°, CP 250 psi., GOR 2,284 cu. ft., perforations 11,140-11,200 ft. Ellenburger IP 338 BOPD, 10/64-in., 52°, TP 1,200 psi., GOR 1,003 cu. ft., perforations 12,245-

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WILDCAT COMPLETIONS

12,330 ft. TD 12,501 ft. Discovery of Texel field.

WEST TEXAS BORDER COUNTIES

Coke County: Mrs. J. B. Dougherty and Dudley T. Dougherty 1-A Whiteside, 290-1A-H&TC. Dry. TD 6,882 ft.

Union Oil Co. of California 1 Davidson, 383-1A-H&TC. Dry. TD 6,502 ft. Elev. 2,078 ft., Ellenburger 6,471 ft.

Union Oil Co. 1 Whiteside, 293-18-H&TC. Dry. TD 7,050 ft. Elev. 2,371 ft., Ellenburger 6,836 ft.

Nolan County: General Crude Oil Co. 1 Sarah E. Porter, 40-5-2&P. Dry. TD 6,724 ft. Elev. 2,520 ft., Cambrian sand 6,695 ft.

Stonewall County: Continental Oil Co. 1 Scroggins, 94-D-H&TC. Dry. TD 6,513 ft.

Lone Star Producing Co. 1 Green, 138-D-H&TC. Dry. TD 6,231 ft.

Seaboard Oil Co. 4 Upshaw, 61-D-H&TC. Dry. TD 6,340 ft.

ILLINOIS

Clark County: Woofter Drilling Co. 1 Wells, SW SW NE 19-9n-12w. Dry. TD 1,003 ft.

Crawford County: J. G. Beard 1 Francis, NE NW SW 4-8n-12w. IPP 40 BOPD, Pennsylvanian sand 1,334-70, 1,318-26, 1,118-25 ft. TD 1,517 ft. (Extends Main pool.)

J. E. Carson 1 Wesley, NE NW NE 8-5n-12w. IPP 70 BOPD, Cypress sand 1,316-26 ft. TD 1,579 ft. (Extends Main pool.)

Saline County: Slagter Producing Co. 1 Wesley, SE NW NW 22-8s-6e. Dry. TD 3,030 ft.

Shelby County: G&W Drilling Co. 1 Dunaway, NW NW NW 3-9n-3e. Dry. TD 2,021 ft.

Washington County: W. W. Dayton 1 Wiese, NW NW NE 16-1s-2w. Dry. TD 2,934 ft.

J. E. Mulligan 1 Kaminski, NE SE SW 7-3s-1w. Dry. TD 1,238 ft.

Wayne County: National Associated 1 McKibben, NE SW NW 26-1n-9e. Dry. TD 3,428 ft.

White County: Slagter 1 Stokes, NW SW SE 21-4s-10e. Dry. TD 3,210 ft.

INDIANA

Posey County: T. M. Egan 3 American Cannel Coal Co., NE SE SE 10-7s-3w. Dry. TD 803 ft.

Skiles Oil Co. 1 Lockwood, SW NE SW 16-4s-12w. IPP 14 BOPD, Rosiclare lime 2,764-68 ft. TD 2,850 ft. (Discovery of Poseyville pool.)

Spencer County: Steckler & Rea 3 St. Meinrad Abbey, SE SE NE 26-4s-4w. Dry. TD 527 ft.

Steckler & Rea 2 Abbey, NW NE SW 13-4s-4w. Dry. TD 474 ft.

Mulzer Bros. 1 Oskins, SE SW NW 13-5s-6w. IPP 20 BOPD, Cypress sand 1,033-40 ft. TD 1,040 ft. (Discovery of Gentryville South pool.)

Vigo County: Marvin Melvin 1 Hall, NE SE NE 3-12n-9w. Dry. TD 757 ft.

KENTUCKY

Muhlenburg County: Adams Petroleum Co. 1 Staples, SE NE SE 22-H-30. Dry. TD 761 ft.

MICHIGAN

Berrien County: Turner Petroleum Corp. 1 Bailey, NE SE NE 21-5s-17w. Dry. TD 790 ft. in Traverse lime.

Lenawee County: Monarch Oil Co. 1 Van Tuyle & Walz, E½ NW SE 8-5s-4e. Dry. TD 1,170 ft. in Dundee-Monroe.

Mason County: Robert S. Anderson 1 Betka, et al, NE SW NW 30-18n-17w. Dry. TD 2,252 ft. in Dundee-Monroe.

Ace Oil Co. 1 Patterson, S½ SW NE 27-17n-15w. Dry. TD 1,980 ft. in Traverse lime.

Washtenaw County: Sun Oil Co. 1 Niehaus, SW NE SW 8-3s-4e. IPF 100 BOPD, after acid, Trenton 3,771 ft., pay 3,962-63 ft., TD 4,038 ft. (New pool.)

PENNSYLVANIA

Clearfield County: Manufacturer's Light & Heat Co. 3 State of Pennsylvania (Tract C), Penfield Quadrangle, Sec. 1 .35 mile south of north line, .1 mile east of west line. Dry. TD 6,783 ft. Oriskany.

Potter County: Keta Gas & Oil Co. 1 Cary, Gaines Quadrangle, Sec. B, 1.7 miles north of south line, .1 mile east of west line. Dry. TD 5,099 ft. Oriskany.

WEST VIRGINIA

Greenbrier County, Anthony Creek district: United Fuel Gas Co. 8240 M. J. Alderman, elevation 2,041 ft. Dry. Oriskany sand 1,055-1,252 ft., Clifton Forge 1,252-1,310 ft., water 1,260-1,265 ft., Keener and lime 1,387-1,568 ft. TD 1,651 ft.

Webster County, Glade district: Nelson W. Taylor, Agent, 1 A. H. Swiger, elevation 2,344 ft., 800,000 cu. ft. gas, Maxon sand, 1,539-1,598 ft., gas 1,540-1,592 ft. TD 1,598 ft.

FLORIDA

Holmes County: A. R. Temple 2 International, C NW SW 4-4n-14w. Dry. TD 4,801 ft. Elev. 83 ft., Lower Cretaceous 4,085 ft.

Levy County: Sphinx Syndicate 1 Prudential, NW NW SE 31-13s-16e. Dry. TD 3,851 ft. Elev. 26 ft., Lower Cretaceous 3,706 ft.

Santa Rosa County: Sunnyland Contracting Co. 1 U.S.A., NE NE NE 23-3n-26w. Dry. TD 6,630 ft. Elev. 145 ft., Lower Cretaceous 6,380 ft.

ALABAMA

Clarke County: Carter Oil Co. 1 Scotch, NW SW 10-10n-1w. Dry. TD 4,831 ft. Elev. 225 ft., Lower Cretaceous 4,763 ft.

MISSISSIPPI

George County: I. P. LaRue et al 1 Dantzler et al, NW SE 29-2s-8w. Dry. TD 8,638 ft. Elev. 123 ft., Lower Cretaceous 8,544 ft.

Hancock County: J. Willis Hughes 1 Russ et al, C NW NW 18-9s-16w. Dry. TD 6,070 ft. Elev. 21 ft., Wilcox 5,333 ft., Salt Mountain 5,777 ft.

Jackson County: J. R. Brown and Crow Drilling Co., Inc. 1 International, SE SW SE 22-5s-7w. Dry. TD 8,872 ft. Elev. 63 ft., lower Tuscaloosa 8,047 ft., Lower Cretaceous 8,630 ft.

Jefferson County: R. M. Harris and Crow Well Service Co. 1 Ball, 49-9n-1w. Dry. TD 6,512 ft. Elev. 348 ft., Wilcox 3,894 ft., base Baker shale 5,730 ft.

Jones County: Marshall R. Young 1 Central, NE NE 18-9n-13w. Dry. TD 12,212 ft. Elev. 309 ft., Lower Cretaceous 8,974 ft.

Wayne County: Lyle Cashion Co. and D. Gammill 1 Pou, NW SE SE 1-9n-6w. Dry. TD 5,000 ft. Elev. 236 ft., first Eutaw sand 4,476 ft. City Bank sand 4,590 ft., Stanley sand 4,660 ft.

SOUTH LOUISIANA

Acadia Parish: Elge Rasberry 3 Lenore Lejune, 19-8s-1w. IP 121 BOPD, 10/64-in., 55°, perforations 9,924-30 ft. TD 10,307 ft. (New pay in Iota field.)

Plaquemines Parish: Kirby Oil & Gas Co. 1 Welsh. 42-20s-29e. Dry. TD 12,525 ft.

Kerr-McGee Oil Industries, Inc., 1-A State Lease 1272, Block 52, Main Pass Area. Dry. TD 6,010 ft.

St. Landry Parish: Tide Water Associated Oil Co. 1 Guillory, 44-6s-2e. Dry. TD 13,098 ft.

Terrebonne Parish: Humble Oil & Refining Co. 6 Ellender, 32-19s-19e. IP 366 BOPD, ⅛-in., 34.7°, perforations 11,610-16 ft. TD 13,500 ft. (New pay in Lirette field.)

Vermilion Parish: Lamson, Bennett & Cole 1 Morgan, North 30° 05' west 1,846-4 ft., and south 89° 20' east 1,679.2 ft. from SWc 34-10s-2e. Dry. TD 11,070 ft.

West Baton Rouge Parish: Lamson, Bennett & Cole 2 State Lease 1909, 3-18s-13e. Dry. TD 10,460 ft. (Directional hole under Mississippi River.)

NORTH LOUISIANA

Concordia Parish: T. J. Glennon 1 Learned, 23-8n-10e. Dry. TD 6,010 ft.

DeSoto Parish: Ralph R. Gilster and James E. Kemp 1 Moselev O. Garland, 25-14n-16w. IP 2,250 M.c.f. of gas plus 2 BC per million, 60.6 per million, Gloyd 5,356-70 ft.; 29,000 M.c.f. of gas per day plus estimated 60 BC per million, 66.5°. Pettit 6,335-53 ft. TD 6,550 ft. (Pettit discovery in Longstreet field.)

Franklin Parish: Shell Oil Co. 1 C. L. Moore, Jr. et al, C SW SW 12-11n-6e. Dry. TD 7,774 ft. (Strat test.)

Morehouse Parish: Atlantic Refining Co. 1 Dorothy W. Barham, C NE NE NE 10-18n-6e. Dry. TD 3,000 ft.

ARKANSAS

Madison County: Wheeler, Blackman & Purnell 1 Clayton Eubanks, 37-15n-27w. Dry. TD 690 ft.

Nevada County: N. B. Hunt 1 McMillian, C NW NW NE 23-14s-22w. Dry. TD 3,501 ft.

Lawton Oil Corp. A-2 Ritchie Grocery Co., 11-14s-20w. IPP 202 BOPD, Glen Rose 2,332-44 ft., 29.4°. TD 2,706 ft. (New pay in Troy field.)

Ouachita County: Harris H. Pace 1 Mary Burton, C SE SE NE 31-15s-17w. Dry. TD 3,024 ft.

Union County: Lawton A-1 Irby, 15-18s-17w. IPP 150 BOPD, Tuscaloosa 3,198-3,212 ft., 41°. TD 5,978 ft., Tuscaloosa extension to Schuler field.)

OKLAHOMA

Carter County: Skelly Oil Co. et al 1 Pierce "D," NE NW 8-2s-2w. Dry. TD 12,059 ft. Third Bromide sand (Geological wildcat).

Sunray Oil Corp. 1-A Fitzgerald, NW SE NE 12-3s-1w. Dry. TD 1,413 ft.

Garfield County: Cobb 1 Neundorf, SE SE SW 11-22n-3w. Dry. TD 2,380 ft.

Garvin County: M. F. Gunby 1 Lee, SW SW SW 24-4n-2e. Dry. TD 3,314 ft.

Jackson County: A. C. Duerr et al 1 Wheeless, SW SW SE 36-2n-22w. Dry. TD 4,528 ft.

Kay County: Cyclone Drilling Co. 1 Moran, NW NW SW 1-27n-1e. Dry. TD 4,133 ft.

Lincoln County: Jones, Shelburne-Pellow Oil Co. 1 Ramig, SE SE SE 21-12n-5e. Dry. TD 4,879 ft.

Warren-Bradshaw Exploration Co. 1 Lauderdale, NE NE SW 1-16n-6e. Dry. TD 3,443 ft.

Love County: A. W. Cherry-V. R. Vasicer, NE NW SW 1-6s-1e. Dry. TD 725 ft.

This stem seat of plain carbon steel, removed from an Adjustable Wing Valve after only 45 days of service on a gas-condensate well, graphically illustrates the seriousness of corrosion.

After 7 years of continuous service on the same well, this stem seat of UNIBOLT "SA" Stainless Steel shows little, if any, harmful effect of the gas-condensate corrosion.

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UNIBOLT "SA" Stainless Steel Christmas Tree Fittings may provide the answer. For the past seven years, in cooperation with a major oil company, UNIBOLT engineers have experimented with various stainless alloys to determine the one most resistant to gas-condensate corrosion. The un-retouched photographs above of identical parts tested on the same well clearly indicate the wisdom of selecting UNIBOLT "SA" Stainless Steel Fittings for corrosive conditions.

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THORNHILL CRAVER CO.

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* Special Analysis, Special Heat-treatment

WILDCAT COMPLETIONS

A. D. Britton 1 Vest et al, NW NW NW 28-6s-2e. IPF 184 BOPD, Dornick Hills 4,034-76 ft., 38.9°, 22/64-in. TD 4,076 ft. (Oil discovery.)

Noble County: Russell Cobb, Jr. 1 Sewell, SE NW NW 35-23n-1e. Dry. TD 4,845 ft.

Okfuskee County: Allied Material Corp. 1 Carter, NE NW NW 19-13n-9e. Dry. TD 4,174 ft.

KANSAS

Cowley County: Orville Parker 1 Wilson, SE SE NE 25-34s-7e. Dry. TD 2,810 ft.

Ellis County: C&G Drilling Co. 1 Herman, SW NE SW 2-11s-19w. Dry. TD 3,651 ft.

Graham County: Petroleum, Inc. 1 Carver, SE SE NW 33-6s-25w. Dry. TD 4,280 ft.

Jones, Shelburne & Farmer 1 Worcester, NW NW NE 13-7s-22w. Dry. TD 3,745 ft.

Greenwood County: Wayne D. Cox 1 Smith Ranch, C NW 18-25s-11e. Dry. TD 2,026 ft.

Turner-NCRA 1 Mast, SW SW NE 15-27s-12e. Dry. TD 2,118 ft.

Kingman County: Pickrell 1 Tjaden "B," NW NW SW 19-30s-7w. IPF 205 BOPD, Mississippian 4,210-40 ft. TD 4,333 ft. (Opens Spivey East pool.)

Ness County: Barnett Oil Co. 1 Shearer, SW SW SE 23-17s-25w. IPP 66 BOPD, Mississippian 4,399-4,405 ft. TD 4,405 ft. (Aldrich Northeast discovery well.)

Pawnee County: Cities Service Oil Co.-Natural Oil & Gas Corp. 1 Guffey, SE NE SW 35-22s-15w. Dry. TD 4,020 ft.

Phillips County: J. J. Lynn 1 Merklein, NE SW NW 33-3s-19w. Dry. TD 3,672 ft.

Rooks County: E. K. Carey 1 Ordway, SW SW NE 21-10s-18w. Dry. TD 3,730 ft.

Stafford County: Hartman 1 McMillan, SW SW NE 33-24s-12w. Dry. TD 4,175 ft.

Stanton County: Huber Corp. 1 Walkemeyer, C NE SW 22-28s-42w. Dry. TD 5,768 ft.

Sumner County: Time Petroleum 1 Cink, SW SW NE 12-34s-3w. Dry. TD 4,650 ft.

NEBRASKA

Banner County: O'Donnell & Edmondson and Phillips Petroleum Co. 1 Thompson, C NE SE 2-18n-55w. Dry. TD 5,854 ft.

New World Oil Co.-Halbert & Jennings 1-B Rogers, NW NW NE 20-19n-54w. Dry. TD 5,397 ft.

Cheyenne County, Rohlfing area: Ohio Oil Co. 1 Maxwell, NE SW NE 11-12n-52w. Dry. TD 5,503 ft.

Willits-Craig-Don Rounds 1 O'Connell, C NW NW 4-15n-47w. Dry. TD 4,511 ft.

Kimball County: Braden, Hoover & National Cooperative Refining Association 1 Lobb, NW SW NE 4-14n-55w. Dry. TD 6,318 ft.

NORTH DAKOTA

Benson County: Shell 1 Togstad, NW NE 22-153n-69w. Dry. TD 3,065 ft. Devonian 3,010 ft.

Rolette County: Sun Oil Co. 1 Espe, NW SW 5-163n-72w. Dry. TD 3,660 ft. Nisku 3,611 ft.

CALIFORNIA

Fresno County: Shell Oil Co. 536X 27, NE SW 27-19s-15e, IPP 19 BOPD, 7 per cent cut, perfs. 530-665 ft., TD 690 ft. (Etchegoin sand discovery in East Coalinga field.)

Kern County: Bradford Bishop 1 Salisbury, 27-26s-28e. Dry. TD 1,273 ft.

C.S.H. Oil Co. 1 Sparks, 11-26s-27e. Dry. TD 2,299 ft.

Oceanic Oil Co. 1-35 C.W.O.D., 35-31s-22e. Dry. TD 3,370 ft.

Superior Oil Co. 73-17 Russell, 17-28s-25e. Dry. TD 15,068 ft.

Monterey County: W. W. Holmes, Oper. 1 Beedy, 34-19s-7e. Dry. TD 3,200 ft.

San Joaquin County: Artnell Oil & Gas Co. 1 Grussendorf, SW NE 7-4n-7e, IPF 700 M.c.f. gas through ⅝-in choke, perfs. 2,346-50 ft., TD 2,810 ft. (Nortonville gas sand discovery, 1½ miles southeast of Galt field.)

San Luis Obispo County: Western Empire Petroleum Co. 1 Mellow, 29-31s-13e. Dry. TD 1,770 ft.

Sutter County: Pearson-Sibert Oil Co. 1 Tom, 5-14n-3e. Dry. TD 4,500 ft.

MONTANA

Blaine County: Amerada 1 Modic, SE SE NE 22-34n-24e. Dry. TD 4,855 ft.

WYOMING

Fremont County: Ryan Oil Co.-Davis Oil Co. 1 Burley Dome, SE NW SE 5-32n-94w. Dry. TD 3,154 ft.

Johnson County, Kaycee Anticline: S. R. McChesney 1 Government, SE NE SW 14-42n-82w. Dry. TD 1,555 ft. Alcova 1,551 ft.

Laramie County, Pine Bluff: J. Ray McDermott 1 Gross, C NE NW 9-14n-60w. Dry. TD 7,403 ft.

Lincoln County, Fontenelle Unit: El Paso-Continental 1 Unit, W½ SE NW 11-24n-113w. Dry. TD 13,250 ft. Nugget.

Niobrara County, Young Woman: Buck Creek Oil Co. 1 Government, NW SW SE 23-35n-65w. Dry. TD 6,173 ft. Second Leo 6,060 ft.

Sheridan County, Decker: Shell Oil Co. 1-A Snyder, NW NW SW 28-58n-84w. Dry. TD 5,022 ft.

Sublette County, Cliff Creek Unit: Richfield Oil Corp.-Cities Service Oil Co. 1

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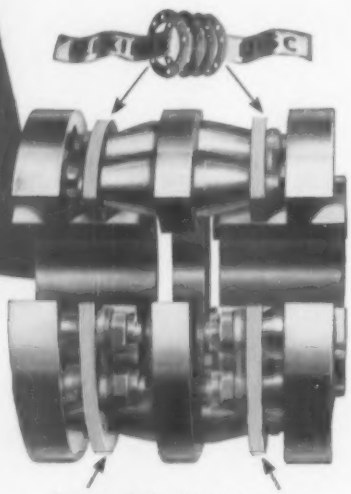

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Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

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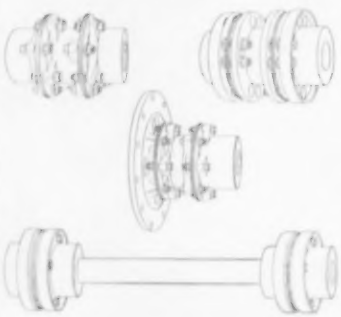
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



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WARREN, PENNSYLVANIA, U.S.A.

Magcobar

Regardless of the "brand" of mud you used on your last well, Magcobar contributed to the fact that **you paid about 15% less for it than you would have in 1941.** That's astounding, isn't it—especially in view of the fact that the average total drilling cost for services and equipment other than drilling mud has increased approximately 65% since 1941. Yes, 1941 was the year Magcobar entered the drilling mud picture and established fair and reasonable prices, highest quality products and good service. These three things are the foundation upon which Magcobar has been built.

Every year since 1941, Magcobar has continued to improve and add new products, multiply many-fold its mining and processing plants, establish more dealers and increase the number of mud engineers in the field.

Look for the Magcobar Dealer sign the next time you need mud. You can be sure of the quality at fair and reasonable prices when it's in the Magcobar bag.

MAGNET COVE BARIUM CORPORATION

HOUSTON, TEXAS

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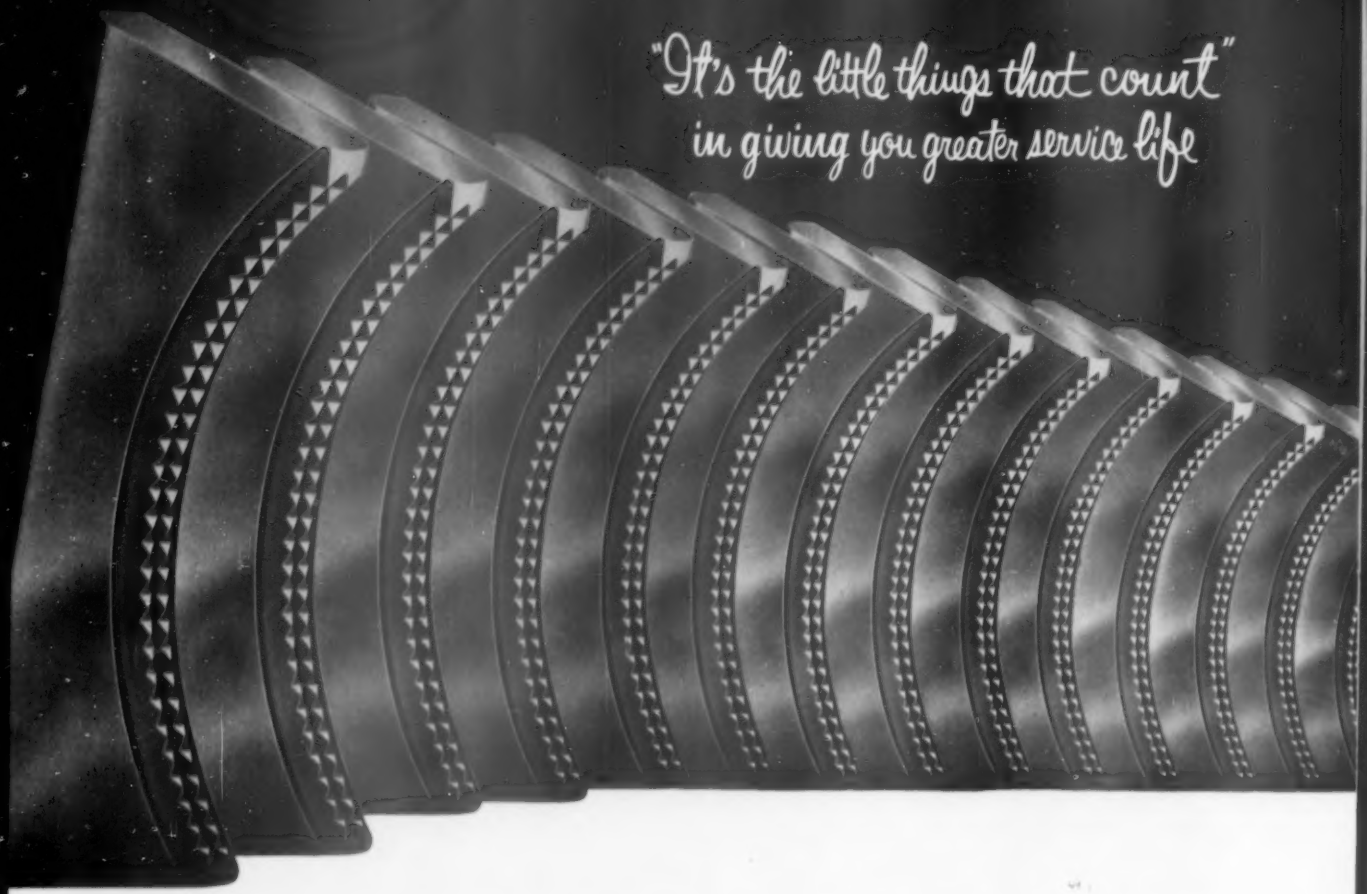
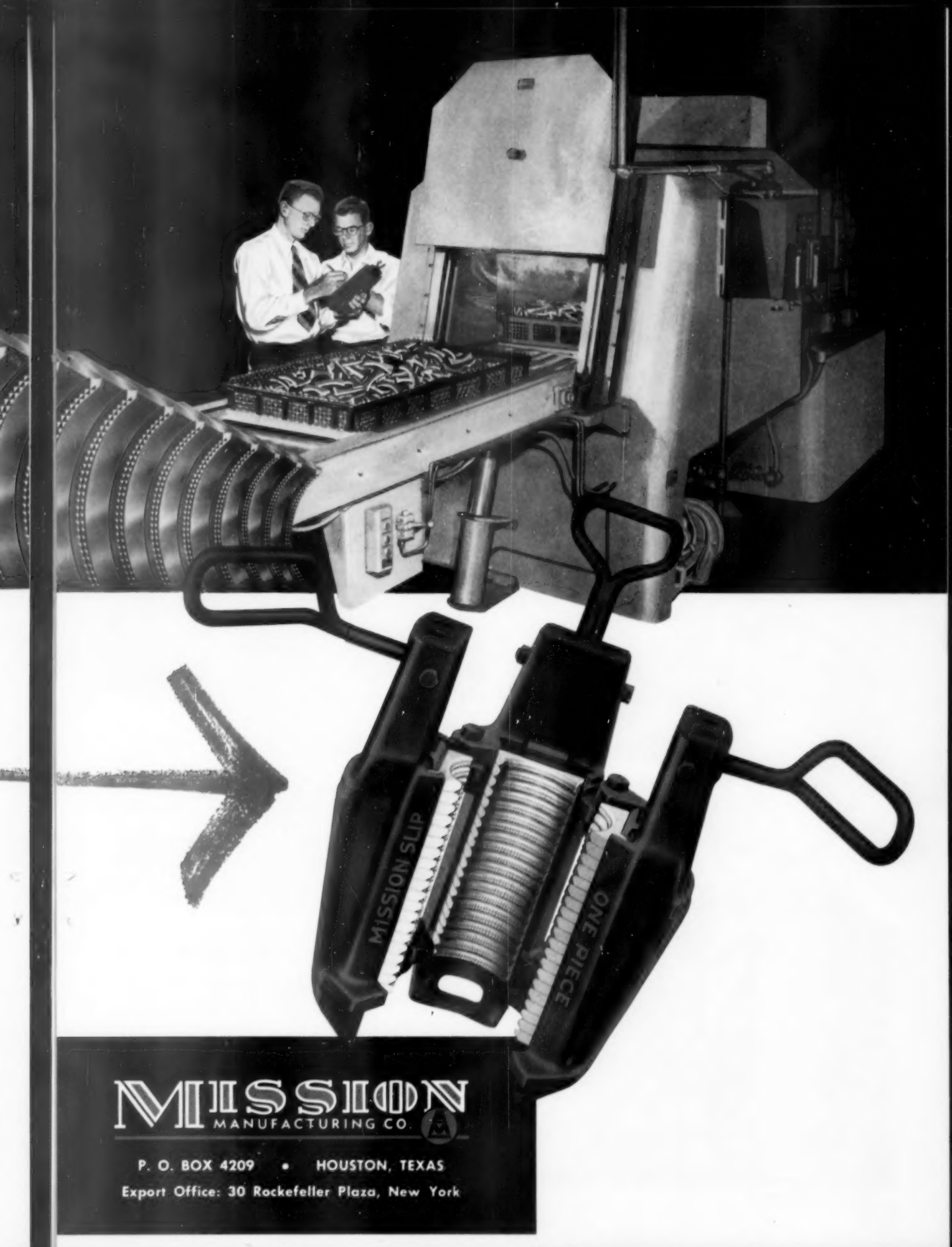


Where Mission makes the difference

The next time you see a crew running pipe with Mission Rolling Dog Rotary Slips, watch how fast and smooth they work. The reason is that Mission long ago made a basic difference (an **exclusive** difference) in slip tooth design and construction with the Mission Rolling Dog Principle that insures a positive, instant grip . . . a smooth instant release. Yes, Mission Rolling Dog Rotary Slips fully encircle and support your pipe with a uniform, cushion-grip.

The bite is firm and strong even for the longest strings, but Mission Rolling Dog Rotary Slips never cut or bottleneck pipe. Here's where Mission slip dogs get their bite. This is a special, automatic furnace in which the slip dogs are heat treated to add the proper hardness. After these "hot dogs" have been in the furnace the exact specified time, they are automatically lowered into a quenching bath. As a result of this carefully controlled step in the manufacturing process, Mission Slip Dog teeth give exceptionally long life and dependable service. The next time you buy rotary slips from your supply store, specify Mission. Mission Rolling Dog Rotary Slips are easier to handle, easier to service . . . make running and pulling pipe faster and safer.

Nothing but the finest will ever bear the name of



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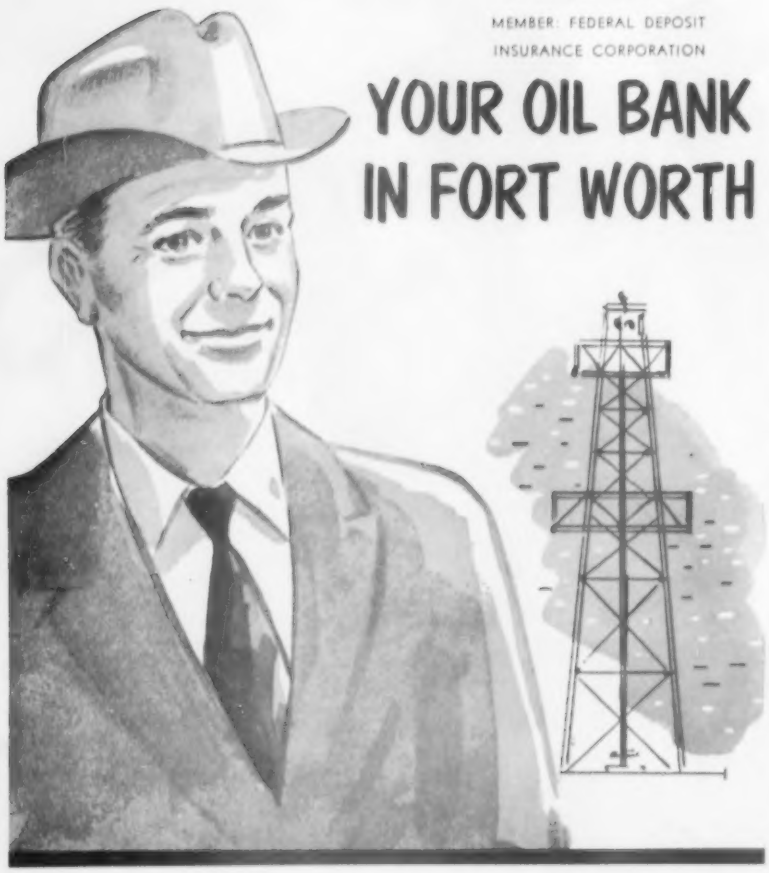


WILDCAT COMPLETIONS

Unit, C NW NE 23-37n-114w. Dry. TD 9,815 ft.

Sweetwater County, East Salt Wells: General Petroleum Corp. 58-24 Unit, SW SW SE 24-14n-101w. Dry. TD 7,533 ft.

UTAH

San Juan County, Chinle Wash: Ohio Oil Co. 1 Navajo, NE SW SW 10-43s-21e. Dry. TD 6,944 ft. Ignacio 6,909 ft.

COLORADO

Boulder County: Calstar Petroleum 1 Government-Hill, SE SE NE 10-3n-70w. Dry. TD 1,233 ft. Water well.

Morgan County: Weber Oil Co. 1 Casper, SE SE SE 20-1n-58w. Dry. TD 6,040 ft.

Seneca Oil Co. and Virgil King et al 1 State, C SW SW 2-2n-55w. Dry. TD 5,230 ft.

Malco Refineries, Inc. 1 State, NE SW NE 16-2n-56w. Dry. TD 5,305 ft.

South Texas Development Co. 1 Skiles, NW NW NW 33-2n-55w. Dry. TD 5,210 ft.

F. W. Baumgartner 1 Garvin, C SE SE 9-3n-59w. Dry. TD 6,100 ft.

Stanolind Oil & Gas Co. 1 State, C SE SE 16-3-59w. IP 1,560 M.c.f. of gas per day, shut-in, gas well. "D" sand discovery, new field. TD 6,200 ft.

O'Donnell & Edmondson 1 Mylander, SW SE NE 25-5n-60w. Dry. TD 6,343 ft.

Washington County: S. D. Johnson 1 Waxman, C NE SW 22-1n-52w. Dry. TD 4,805 ft.

Shell 1 Bauer, C NE SE 21-2s-52w. Dry. TD 4,545 ft.

Woodward Oil Co., Inc.-Lohmann-Johnson Drilling Co. 1 Nelson, SE SE SW 24-2s-56w. Dry. TD 5,170 ft.

Shell 1 Downing, C NE NE 3-3s-54w. Dry. TD 4,800 ft.

Weld County: McMahon and Bullington 1 Biggs-Government, C SW SE 3-11n-57w. Dry. TD 6,769 ft.

MANITOBA

Sweetgrass 1 Pilot Mound, LSD 3, 9-4-11w1. Dry. TD 3,185 ft.

SASKATCHEWAN

California Standard 2-34 Burrows, LSD 2, 34-16-1w2. Dry. TD 2,820 ft.

Shell A-7-11 Chelan, LSD 7, 11-42-11w2. Dry. TD 2,115 ft.

Socony-Sohio 29-6 Roanmine, LSD 6, 29-4-21w2. Dry. TD 6,790 ft.

Phillips-Husky 1 Prelate, LSD 4, 13-23-25w3. Dry. TD 3,281 ft.

Amurex-Canadian Southern 1-10 Herter, LSD 10, 21-15-28w3. Medicine Hat gas well. TD 1,717 ft. PBTD 1,683 ft.

ALBERTA

Cal-Standard 2 Grassy Island Lake, LSD 11, 31-31-5w4. Dry. TD 3,200 ft.

Anglo-Socony et al 12-3 Bain, LSD 3, 12-5-3w4. Dry. TD 4,592 ft.

Canadian-Export Gas 7-28 Irvine, LSD 7, 28-11-2w4. Medicine Hat gas well. TD 1,738 ft.

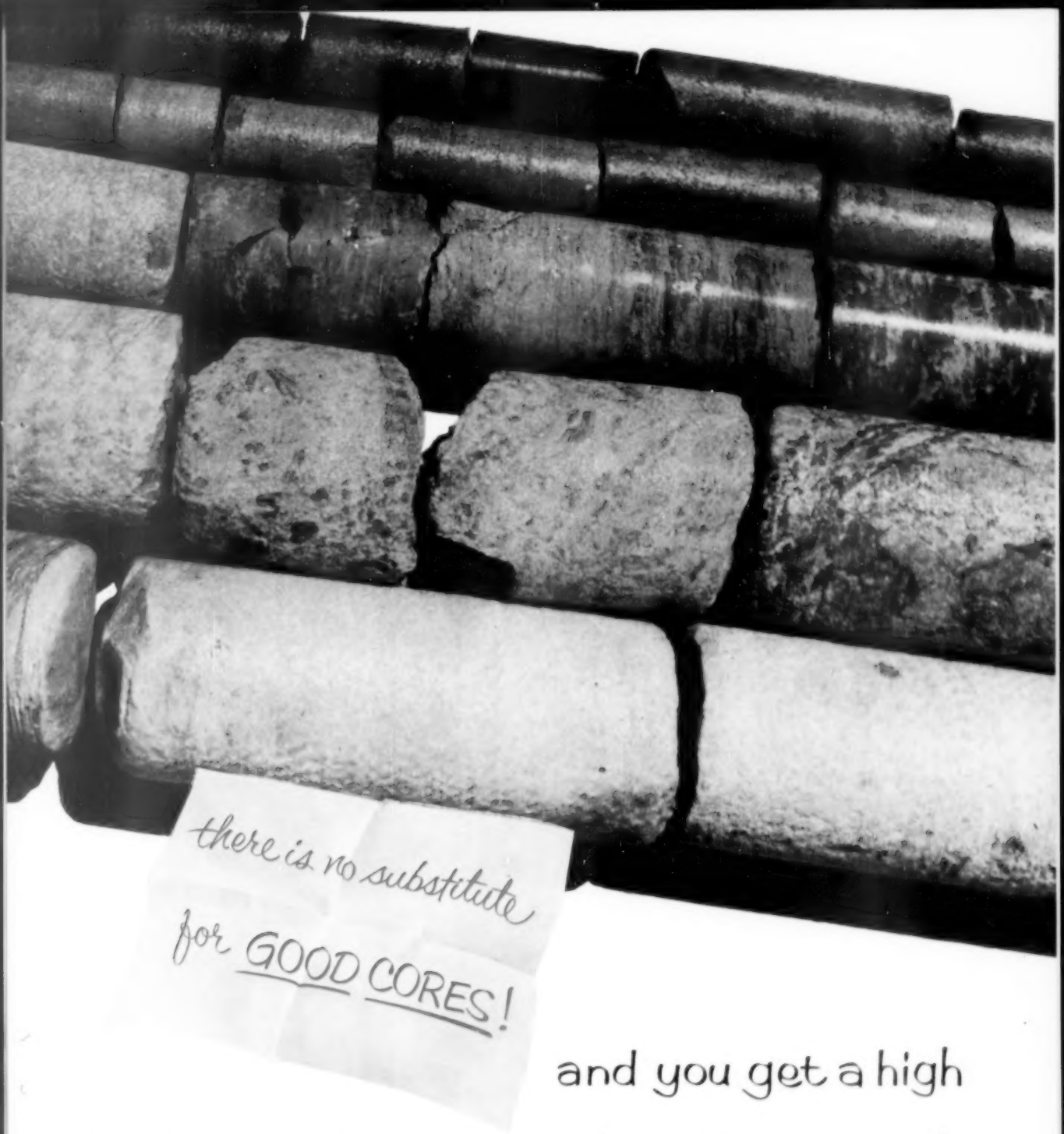
Imperial 5-5-39-26 Red D eer, LSD 5, 5-39-26w4. Viking oil well. TD 5,350 ft.

Imperial 10-12 Neerlandia, LSD 10, 12-61-5w5. Indicated Viking gas well. TD 5,244 ft. PBTD 3,900 ft.

Gulf 16-14 Rowley, LSD 16, 14-31-20w4. Dry. TD 5,778 ft.

Chamberlain 6-16 North Buffalo, LSD 6, 16-22-6w4. Gas well. TD 3,074 ft.

Union-Imperial 11-15 South Vimy, LSD 11, 15-58-25w4. Viking gas well. TD 4,050 ft. PBTD 2,686 ft.



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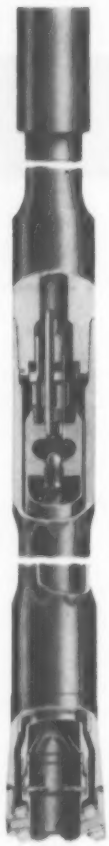
To get good cores, specify one of the REED Core Barrels shown at the right.



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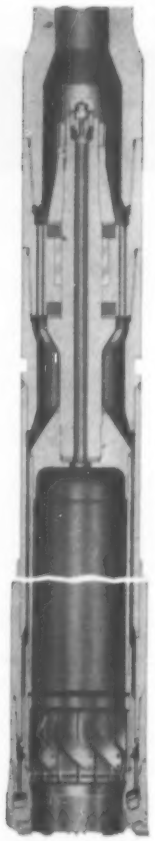

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4922

Equipment Men

Mid-Continent Names Store Manager at Sundown, Tex.

L. H. SAUNDERS

L. H. Saunders has been promoted store manager of Mid-Continenf Supply Co.'s Sundown, Tex., store, according to Ken W. Davis, president.

Saunders formerly served the company as a city salesman in Odessa, Tex. He has worked for Mid-Continent 4 years, joining the company at Odessa.

Mountain Iron Expands To Rocky Mountain Area

Mountain Iron & Supply Co., supplier of oil-field equipment, has expanded its facilities to include the Rocky Mountain area, according to an announcement issued by the company's general offices in Wichita, Kans.

W. E. (Bill) Frevert has been appointed sales manager for the territory and will maintain headquarters in Denver. Frevert was formerly superintendent of the company's store at Russell, Kans. Bob Reissig, formerly field salesman at the Russell store, has been promoted to succeed Frevert, there.

In making the announcement, S. O. (Bud) Beren, vice president and general

W. E. FREVERT

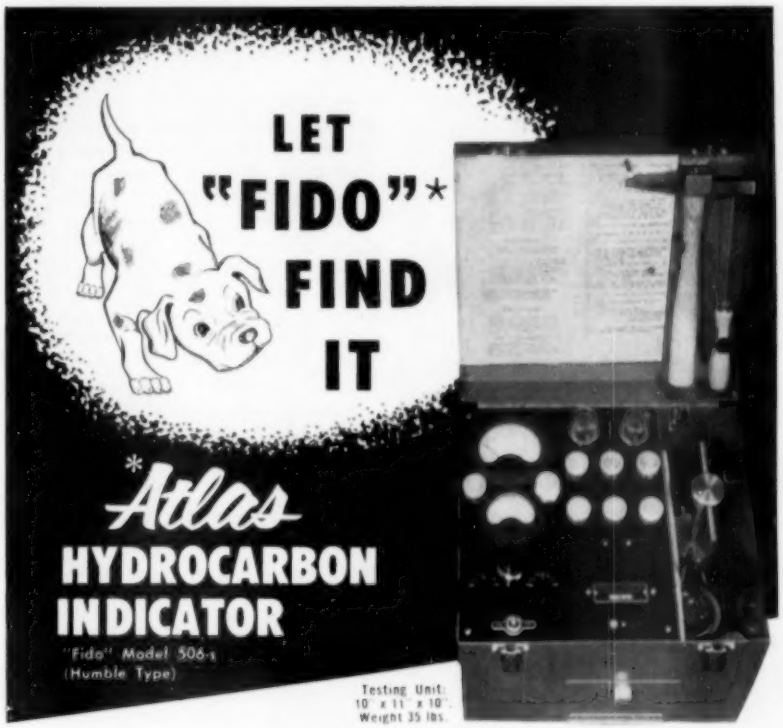
BOB REISSIG

manager, explained that the move will enable Mountain Iron to better serve customers operating in that area.

Frevert has been with the organization since 1946, and had considerable experience in the field prior to that. Reissig has been with the company since 1940.

The addition of Denver brings the number of Mountain Iron locations to 12. The others are in Augusta, Great Bend, Madison, McPherson, Plainville, Russell, Independence, and Wichita, Kans.; Tulsa and Bartlesville, Okla.; and Parkersburg, W. Va.

(Continued on page 194)



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The new Atlas Indicator will detect all formations containing commercial hydrocarbons quickly at well sites. This modern instrument has proved to eliminate guesswork from side-wall and other coring. It clearly indicates types of hydrocarbons present, approximate top and bottom of probable producing zones, and actually measures amount of gas in cores rather than absence of water. Furthermore, Fido may be used with regular drilling muds or oil emulsion fluids with substantial saving in drilling time. Fido's sturdy steel case, with baked enamel finish, contains gas collecting syringes, stainless steel core crusher, tester for drilling fluids, stainless steel hammer, pick and core trays. Four Atlas supersensitive hydrocarbon detecting elements and a special electrical circuit provide fast, reliable selection of methane, propane and butane gases. Each Fido calibration is exactly the same, allowing comparisons with other wells and exchange of data. Designed especially for field use, the compact Atlas Indicator is equipped with HI-LO Sensitivity Switch, long element life, rechargeable batteries, automobile and room battery chargers, spare elements, syringes and maintenance equipment.

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9" x 9" x 9".
Weight 12 lbs.

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Hunch Paid Off

Quick deal gave Reading his start with Sun Oil

EDWIN J. READING, manager of Sun Oil Co.'s central production division, was a newcomer to the oil industry when he swng his first big lease deal back in the mid-30's.

On a routine trip to western Kentucky, the young landman chanced to meet a friend who told him of 72,000 acres that could be acquired if the company committed itself to drill four wells on the acreage. Although Reading admittedly knew little about the oil business, the prospect looked enticing. Playing a hunch, he put in a telephone call to the late J. Edgar Pew, then vice president in charge of production at Philadelphia. Pew gave him permission to close the deal.

Reading's fast action firmly implanted Sun Oil Co. in Kentucky, leading to much of its lush production in the Morganfield district. He has been swinging big deals for Sun Oil Co. ever since.

Political background . . . The Sun official might have made his mark in politics if he hadn't listened to the advice of his father, the Rev. Benjamin F. Reading, back in 1935. At his father's suggestion, young Reading went to see H. O. Cameron, then manager of Sun's refinery at Toledo and manager of the company's Michigan production division. Cameron put the young man on the payroll and assigned him to the land department.

Prior to that, young Reading had helped organize a nonpartisan movement intent on cleaning out Toledo's city hall. When his candidate for mayor was swept into office, Reading was drafted as the city's assistant street commissioner. After the depression hit, he was called on to supervise relief activities in the city.

Although his oil activities have required most of his attention since 1935, Reading still takes unusual interest in civic affairs. Politics now ranks as one of his chief hobbies, along with fishing and Boy Scout work.

Since their three college-age children were big enough to toss a hook into the water, Reading and his wife have made frequent sojourns to their favorite fishing spot at a lake near Alpena, in western Michigan.

Whirlwind marriage . . . The Readings' family life has not always been so complacent, however.

In 1924, when Reading was on the road almost constanly as a service department representative of Willys-Overland, he rushed back to Toledo for a hasty marriage and was greeted with instructions to leave immediately for Texarkana, Ark. The wedding went through on schedule, with his father officiating at the ceremony, but he left his bride, the former Miss Helen Wickenden, a few hours later. Their honeymoon was postponed for 2 months.

Born at Radnor, Ohio, May 29, 1897, Reading grew up among the oil fields. He attended Ohio Wesleyan University, where he played both football and basketball. His college career interrupted by World War I, Reading capitalized on his sports experience by coaching high-school football and basketball at Powell, near Columbus, to help pay his way toward a bachelor of arts degree.

Moves up . . . The easy-going executive has moved fast since joining Sun Oil Co. 19 years ago. In 1936 he became Sun's first production-department representative in Illinois. He was promoted to division land manager in 1941 and in 1953 he moved up to division manager.

He has been secretary of the Indiana Oil and Gas Association since its founding and he served as first president of the Evansville Petroleum Club.

He also is a director of both the Illinois and Kentucky Oil and Gas Associations; former chairman of the Illinois chapter, American Petroleum Institute; a director for Indiana of the Independent Producers Association of America; and an Illinois director for the Mid-Continent Oil and Gas Association.

HILL SANDERS

Hill Sanders has resigned as vice president and general manager of Sun Pipe Line Co.'s crude-lines department at Beaumont, Tex., to become president of Mid-Valley Pipeline Co. at Longview, Tex. **James E. Ford,** formerly vice president and general superintendent of Sun Pipe Line's products-lines department, has been named to replace Sanders. As president of Mid-Valley Sanders will replace **E. F. Morrill,** who has joined Standard Oil Co. (Ohio) as head of its new petrochemical division. Replacing Ford as superintendent of Sun Pipe Line's products-lines department will be **Charles Pinkner,** formerly superintendent of the company's southwest area at Corpus Christi. **James Neill Fuquay,** assistant superintendent of the crude-lines department, will take over Pinkner's former duties at Corpus Christi. Sanders joined Sun Pipe Line in 1932 and became president of the firm in mid-1947. Ford started work for Sun in 1930 as an employe of Susquehanna Pipe Line Co. of Pennsylvania which later became Sun Pipe Line's products-lines department. He was named vice president and general manager of that department in 1947.

JAMES E. FORD

C. PINKNER

L. T. Wilson has been promoted to superintendent of Shell Oil Co.'s refinery at Norco, La. Wilson, who joined Shell in 1933 at the Wilmington, Calif., refinery, has been serving as assistant superintendent of Shell's Martinez, Calif., refinery since 1949.

Robert W. Campbell has been elected vice president and manager for United States operations of Williston Oil & Gas Co. with headquarters in Casper, Wyo. **Alex Clark** has been promoted to manager of exploration for Williston with headquarters in Calgary. **W. D. Lundberg,** engineer, and **Paul J. Dunn, Jr.,** have been transferred to the company's Calgary offices.

PERSONALS

Z. C. Ambrose has been appointed assistant president of Associated Oil & Gas Co. Ambrose will be in charge of the oil and gas producing division of the company. Before joining Associated, Ambrose had served since 1947 as vice president and manager of Southwest Gas Producing Co., and Carbons Consolidated, Inc. He was also president of Monla Gas Co., Inc., and a director of the parent company, Commonwealth Gas Corp. of New York.

Ralph F. Atkinson, former production superintendent of British American Oil Co., Ltd., in Manitoba, has opened an office as a consultant in that province. Atkinson was graduated from the University of Oklahoma in 1949 and has been with British American since then.

D. A. (Doug) Fraser, former manager for Redwater Utilities, Calgary, has resigned to become division manager of Sapphire American Petroleums, Inc., at Robinson, Ill.

O. N. Miller, general manager of Standard Oil Co. of California's manufacturing department for the past 8 years, has been appointed a vice president. Miller joined Socal in 1934 and has had experience in both the research and refining fields. Before moving to the San Francisco offices in 1946, Miller was superintendent of the cracking division at Socal's El Segundo refinery in southern California.

A. M. Van Damme, assistant geophysicist with Gulf Oil Corp., has been assigned to the Fort Worth production division where he is doing seismic interpretation. Van Damme recently returned from British Honduras, where Gulf was conducting seismic exploration.

Russell J. Judah has been named compressor-department division engineer for Transcontinental Gas Pipe Line Corp. at Atlanta, Ga. Judah had been serving with Transco as a junior engineer in the compressor department in the Houston office.

William A. Adent has been named regional manager of William Ross Cabeen & Associates, Dallas. Before his promotion, Adent was division manager for the firm at Midland, Tex.

James T. Stringfield has been promoted to staff geologist by Arkansas Fuel Oil Corp. at Shreveport. Stringfield formerly was a subsurface geologist at Lafayette, La.

J. R. CUTHBERT

J. R. Cuthbert has been named deputy assistant to the president of manufacturing by Standard Oil Co. (Ohio). Cuthbert had been manager of Ohio Standard's No. 1 refinery at Cleveland. **J. S. Dalton** has been promoted to manager of No. 1 refinery from his position of general superintendent of the refinery.

J. S. DALTON

G. R. THOMPSON

G. R. Thompson, who had been serving as assistant general superintendent of No. 1 refinery, has been advanced to Dalton's position as general superintendent. **F. G. Brown,** former manager of the Latonia refinery of Sohio Petroleum Co., has been appointed refinery consultant, a position he will hold until his retirement in June 1956. **Ray Elo** of Latonia will take over the managerial administration of the refinery as general superintendent.

F. G. BROWN

RAY ELO

Clifford R. Horn, former production engineer with Panhandle Eastern Pipe Line Co. at Liberal, Kans., has been promoted to gas supply engineer with the company at Kansas City.

Dr. Arlie A. O'Kelly has been appointed director of research by Pan American Refining Co. at Texas City, Tex. O'Kelly formerly was with Alox Corp. as technical director. Before serving with Alox, O'Kelly had 15 years' experience with Socony-Vacuum Oil Co., Inc., at Paulsboro, N. J., as assistant director and associate director of research and development.

N. B. Mavris has been appointed superintendent of Yellowstone Pipe Line Co., with headquarters in Spokane, Wash. Mavris was formerly assistant chief engineer for Continental Pipe Line Co. at Ponca City, Okla.

A. M. Souby has been promoted to research specialist by Humble Oil & Refining Co. at its Baytown, Tex., refinery. Souby joined the research and development section at Baytown in 1939 and has been in that department since.

Oscar H. Goodman has been named superintendent in charge of operations in Kentucky for Buffalo Oil Co. with headquarters at Paintsville, Ky. Goodman has been serving as production superintendent for Buffalo at Malgamar, N. M.

J. Peter Smith, former member of the geological department of Carter Oil Co., has resigned to become an independent producer and geological engineer at Carmi, Ill. Smith served as district geologist at Carmi for 7 years while with Carter.

W. W. Clawson has been named president of Mobil Producing Co., a newly formed subsidiary of Socony-Vacuum Oil Co., Inc., which succeeds Socony's Pegasus division. Clawson, who had been serving as manager of Pegasus

PERSONALS

division, is also president of Socony-Vacuum Oil Co. of Canada, a post he will continue to hold. **A. F. Barrett** has been named vice president and manager of production for Mobil and **John T. Rouse** will be vice president and manager of exploration.

O. D. Harper has been promoted to the production department of Carter Oil Co. succeeding **C. G. Herrington,** who will devote his full time to being a director of the company. Harper began his career with Carter in 1924 and has served as assistant manager of the production department since January 1, 1954. **Henry B. Ferguson** has been named head of Carter's geophysical research section. Ferguson has worked with seismic instrument development since joining the Carter research group in January 1948.

Dr. Ahlborn Wheeler has joined the research staff of Houdry Process Corp. Wheeler is widely known throughout the oil industry for his work with catalysis. Wheeler formerly worked with Shell Development Co. where he studied the catalytic properties of evaporated metal films. Since 1946 he has been with the polychemicals department of E. I. du Pont de Nemours & Co., Inc., studying catalytic hydrogenation and reaction rates in catalyst pores.

J. T. May, former Rocky Mountain division production superintendent for Chicago Corp., has been transferred to Oklahoma City as district superintendent for Champlin Refining Co., Enid, Okla. and Peppers Refining Co., Oklahoma City.

L. B. Myers has been transferred to western Kansas division at Great Bend as production engineer by Phillips Petroleum Co. Myers had been serving as district engineer in the Illinois district at Carmi, Ill.

Marvin F. Owens has been named vice president in charge of the new oil and gas department of Central Bank & Trust Co., Denver. Owens recently resigned as chief petroleum engineer and assistant production superintendent for Bay Petroleum Corp. Before joining Bay, Owens was with British-American Oil Producing Co.

Eugene C. Roberts, valuation engineer with Sinclair Oil & Gas Co., has been transferred from the company's Tulsa offices to Houston.

John R. Donnell, former assistant manager of supply and transportation

J. R. DONNELL

O. F. MOORE

for Ohio Oil Co., has been elected a vice president and director of the company and advanced to manager of the department to succeed **O. F. Moore,** who has retired. Donnell has been with Ohio since 1936 and since 1950 has been serving as treasurer of the company. Moore joined Ohio in 1909 as a stenographer in the Robinson, Ill., field office. In 1946 he was elected a director and vice president of the company and appointed manager of the department from which he is retiring.

L. J. Brewer has been named president of Esso Standard Oil, S.A., with headquarters in Havana, Cuba. Brewer has served with various Esso affiliates including 17 years at the Aruba refinery.

E. J. McClanahan has been appointed vice president and director of western operations by the board of directors of Standard Oil Co. of California. McClanahan will be in charge of operations in seven western states, Alaska, and Hawaii.

I. J. Pierce, former district manager of Phillips Petroleum Co. in Calgary, has been named manager of Oklahoma City division of Phillips' land and geological department. **H. R. Segnar, Jr.,** district geologist, has been promoted to division geologist.

R. C. Brown, president and general manager of Hudson's Bay Oil & Gas Co., Ltd., has been appointed to the general board of governors of the Canadian Petroleum Association. Other appointments by the board include **O. I. Torkelson,** vice president of western Canada exploration and production department of British American Oil Co., Ltd., named to the board of directors of Alberta division, and **B. Gillespie,** president and managing director of Oil Well Operators, Ltd., appointed second vice chairman of the board of directors of the Alberta division.

T. R. Carpen has been promoted to division geologist by Continental Oil Co. at Denver succeeding **J. H. Goth, Jr.,** who has resigned. **A. J. Crowley** has joined Conoco at Denver as Rocky Mountain region research geologist.

P. McDonald Biddison, gas-industry consultant and former vice president of Trunk Line Gas Supply Co., has been elected president and chief executive officer of Texas-Ohio Gas Co.

DEATHS

Joseph W. Loftin, 69, retired district superintendent for Sinclair Oil & Gas Co., died in Tulsa August 27 following a heart attack. Loftin had suffered a previous attack about a month ago and had been hospitalized for 10 days.

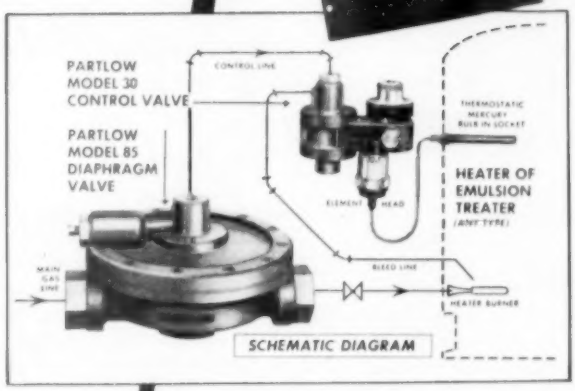
Fred C. Randall, 74, retired general manager of Sinclair Cuba Oil Co., died August 28 in Havana, Cuba.

W. S. McManigle, 66, general field superintendent for Hanley & Bird, Bradford, Pa., died at Wooster, Ohio, August 26.

Virgil O. Wood, 62, partner in Broswood Oil Co. and a prominent Tulsa geologist, died recently in an Oklahoma City hospital following a cerebral hemorrhage.

Max W. Ball, 68, Washington consultant and first director of the Department of Interior's Oil and Gas Division, from 1946 to 1948, died August 28 after a heart attack. Ball began his petroleum career with the Geological Survey in 1906 and served with it until 1916, when he joined the Bureau of Mines. Following this government service, he served with Royal Dutch-Shell and was president at various times of Western Pipe Line Co., Marine Oil Co., Argo Oil Co., Abasand Oils, Ltd., and Royal Royalties, Ltd. In 1953 Ball went to Turkey to help that country write a liberal oil law which would permit development of resources by foreign capital. Ball was a former president of American Association of Petroleum Geologists and author of "This Fascinating Oil Business."

Get the surprising facts on this money-saving PARTLOW THERMOSTAT



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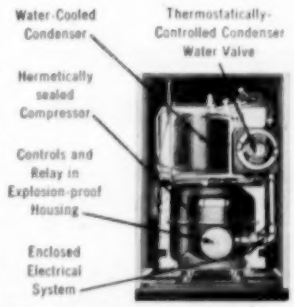

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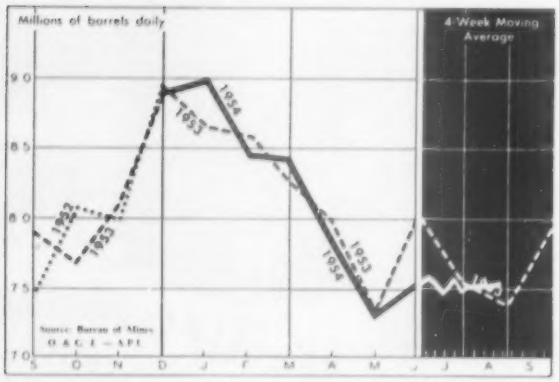
Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,142,850	DOWN	21,200	DOWN	462,997
Crude stocks	277,788,000	DOWN	2,036,000	DOWN	4,970,000
Completions	946	DOWN	119	DOWN	64
Refinery runs	6,955,000	UP	19,000	DOWN	279,000
Gasoline stocks	153,757,000	DOWN	1,260,000	UP	12,282,000
Four-product stocks	358,904,000	UP	2,765,000	UP	15,662,000
Total imports	988,900	UP	57,100	DOWN	73,100

TOTAL DEMAND – ALL OILS



Residual Use Important Factor in Poor Demand Showing in First Half

THE most important factor in the small demand increase in the first half of the year was the big drop in consumption of residual fuel, the product that has been the refiner's problem for many years.

Domestic demand for residual for the first 6 months of the year was down for a total of 23,084,000 bbl. or 127,500 bbl. daily. This represents a decrease of almost 8 per cent.

Since the average domestic demand for all oils for the first half was about 7,700,000 bbl. daily, the drop of 127,500 bbl. daily in demand for residual was about 1.7 per cent of total domestic demand. Exports of residual increased about 1,100,000 bbl. for the period or a little over 6,000 bbl. daily, giving a net decrease in total demand of 21,962,000 bbl. or 121,200 bbl. daily.

New supply . . . On the supply side, refinery production of residual decreased 12,131,000 bbl. or 67,000 bbl. daily. Imports dropped off 4,000,000 bbl. for a total decrease of 16,100,00 bbl.

The difference between the 21,960,000 bbl. drop in demand and the reduction of 16,100,000 bbl. in supply shows up as an 850,000-bbl. increase in stocks for the first half of 1954 compared with a decrease of slightly over 5,000,000 bbl. last year.

Residual has been an unprofitable product for the refiner in that it normally sells for less than crude. Also, residual prices are influenced more by prices of competitive fuels than by the availability of the product itself.

In some marketing areas, residual fuel has been replaced by slack-season sales of natural gas. In other districts, coal prices have been lower, causing some of the large industrial accounts to shift to solid fuel.

Refiners could not have held the 1953 customers without drastic cuts in residual prices.

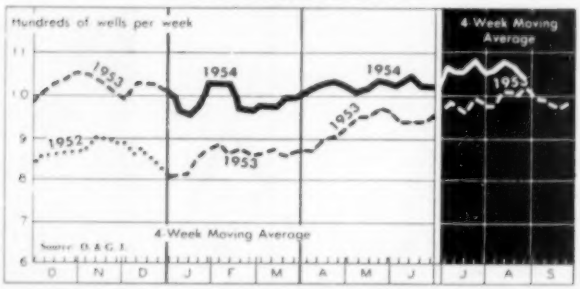
Effect on crude production . . . If normal yields had been maintained, the increase in residual production of 67,000 bbl. daily would have called for a jump in runs of between 300,000 and 400,000 bbl. daily. Such a gain would have further complicated the gasoline-stock problem.

Since refiners are trying to reduce residual yields, suppliers are expected to keep the more desirable part of the residual market and leave the other to gas and coal even if this decision does slow down increases in demand for all oils.

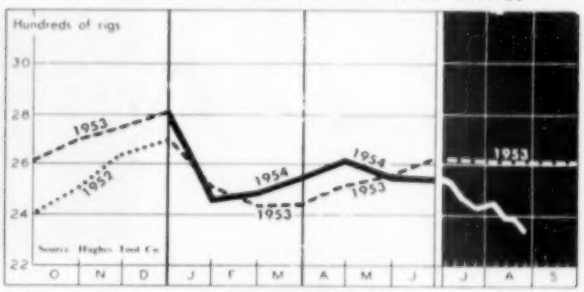
Extreme competition between imported residual and coal would tend to lower residual prices which in turn will cut refiners' realization.

Markets . . . Natural-gasoline prices increased 0.5 cent a gallon on August 30. Pennsylvania Grade crude prices were adjusted to cover increased transportation cost, effective September 1.

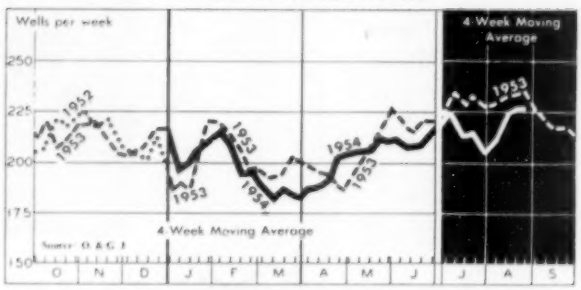
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

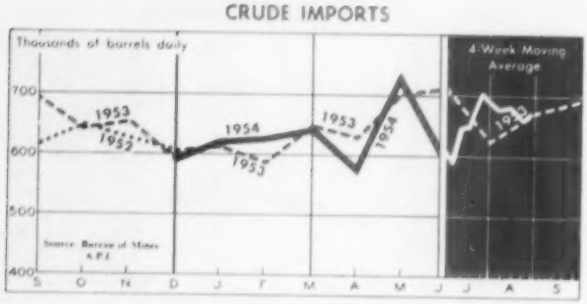
Area—	8-30-54	Change from 8-23-54	Change from 8-31-53
Gulf Coast	487	— 9	— 44
N. and W. Texas-New Mexico	696	—43	— 99
Arkansas-N. Louisiana-E. Texas	175	2	— 8
Oklahoma	283	—12	— 84
Kansas-S. Nebraska	175	— 8	20
Illinois-Eastern	143	20	— 5
Rocky Mountain	248	—10	— 10
Pacific Coast	125	3	— 48
Total United States	2,332	—57	—278
Western Canada	128	—17	— 45

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 28, 1954

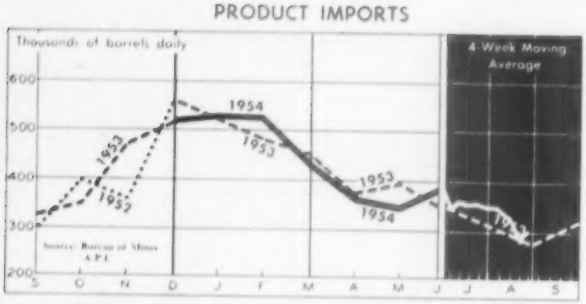
	Total of all wells: Comp.	Oil	Gas	Dry	Footage	Cum. 1954	Cum. 1953	Wildcat completions and discoveries: Oil	Dist.	Gas	Dry	Total	Cumulative total, 1954: Oil	Dist.	Gas	Dry	Total
Ala.-Ga.-Fla.	4	0	0	4	20,113	76	95	0	0	0	4	4	2	0	2	65	69
Arkansas	16	7	0	9	70,632	422	333	2	0	0	3	5	19	0	4	79	102
California	39	29	1	9	170,200	1,577	1,705	1	0	1	7	9	42	1	9	339	391
Colorado	22	3	4	15	111,948	861	448	0	0	1	12	13	24	0	12	333	369
Illinois	44	29	0	15	100,929	1,852	1,233	2	0	0	3	5	8	0	0	233	241
Indiana	25	15	0	10	38,946	516	849	2	0	0	4	6	7	0	0	96	103
Kansas	83	45	3	35	292,652	3,004	3,245	2	0	0	12	14	52	0	14	397	463
Kentucky	13	3	5	5	30,217	733	717	0	0	0	1	1	12	0	3	76	91
Louisiana	72	46	8	18	453,894	2,279	1,715	2	0	1	8	11	75	39	27	225	366
North	33	24	4	5	98,503	1,237	712	0	0	1	3	4	11	3	11	89	114
South	39	22	4	13	355,391	1,042	1,003	2	0	0	5	7	64	36	16	136	252
Michigan	16	4	1	11	41,835	366	387	1	0	0	4	5	13	0	0	141	154
Mississippi	10	3	0	7	78,696	273	247	0	0	0	6	6	7	0	0	98	105
Montana	3	2	0	1	15,495	199	261	0	0	0	1	1	3	0	1	60	64
Nebraska	12	6	0	6	65,326	257	221	0	0	0	5	5	15	0	3	84	102
New Mexico	15	10	1	4	75,534	713	923	1	0	0	4	5	13	0	14	74	101
North Dakota	8	6	0	2	48,821	191	173	0	0	0	2	2	4	0	0	69	73
Ohio	18	6	6	*6	44,276	752	697	0	0	0	0	0	3	0	4	9	16
Oklahoma	149	90	4	†55	489,616	6,088	4,878	1	0	0	11	12	77	3	18	427	525
Pennsylvania-New York	41	14	13	‡14	66,274	1,566	1,671	0	0	0	2	2	0	0	5	28	33
Texas	317	162	28	127	1,366,927	12,274	11,436	11	0	2	81	94	544	50	122	2,801	3,517
Southwest (1 & 4)	52	25	6	21	242,821	1,762	1,867	1	0	1	16	18	75	23	33	486	617
Gulf Coast (2 & 3)	50	25	2	23	295,609	1,784	1,674	1	0	0	13	14	57	22	37	442	558
East (5 & 6)	13	5	2	6	68,095	634	532	1	0	0	5	6	10	0	13	188	211
North Central (7-B & 9)	101	49	1	51	295,590	4,597	4,342	4	0	1	27	32	252	4	16	1,127	1,399
West (7-C & 8)	74	52	0	22	392,609	2,839	2,484	4	0	0	19	23	148	0	16	495	659
Panhandle (10)	27	6	17	4	72,203	658	537	0	0	0	1	1	2	1	7	63	73
Utah	1	0	0	1	6,944	48	47	0	0	0	1	1	3	0	1	25	29
West Virginia	20	0	14	6	50,120	381	404	0	0	1	1	2	0	0	20	11	31
Wyoming	18	9	0	9	106,410	869	468	0	0	0	8	8	28	0	4	132	164
Miscellaneous	0	0	0	0	0	87	56	0	0	0	0	0	2	0	0	19	21
Total United States	**946**	489	88	369	3,745,805	35,384	32,209	25	0	6	180	**211**	953	93	263	5,821	7,130
Total previous week	1,065	566	97	402	4,287,508			20	0	20	201	241	928	93	257	5,641	6,919
Total August 29, 1953	1,010	517	78	415	3,955,199			17	0	5	193	215	966	73	258	6,027	7,324

Service wells included: *1, †5, ‡12.

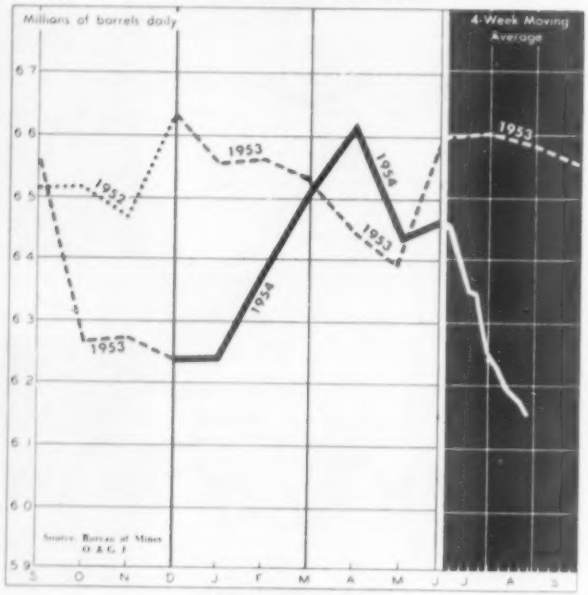
CRUDE IMPORTS



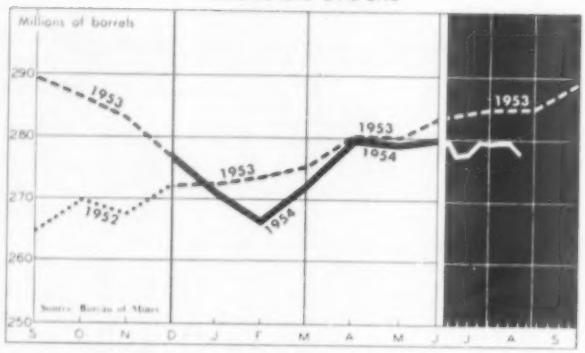
PRODUCT IMPORTS



CRUDE-OIL PRODUCTION



CRUDE-OIL STOCKS



DAILY AVERAGE PRODUCTION FOR WEEK

	August 28			Aug. 21
	Crude oil	Lease condensate	Total	total
Alabama	4,100		4,100	4,400
Arkansas	76,800	500	77,300	75,900
California	972,800		972,800	974,600
Colorado	128,700		128,700	128,700
Eastern	55,100		55,100	55,100
Florida	1,500		1,500	1,500
Illinois	183,000		183,000	180,600
Indiana	28,600		28,600	28,700
Kansas	316,400		316,400	329,300
Kentucky	37,400		37,400	35,800
Louisiana	601,350	37,950	639,300	639,550
North	107,350	2,800	110,150	110,400
South	494,000	35,150	529,150	529,150
Michigan	27,700		27,700	32,800
Mississippi	87,300	3,600	90,900	90,750
Montana	40,300		40,300	41,100
Nebraska	19,000		19,000	19,400
New Mexico	205,850	1,650	207,500	207,700
Oklahoma	498,400		498,400	500,100
Texas	2,508,000	44,650	2,552,650	2,552,650
Dist. 1	41,200	350	41,550	41,550
Dist. 2	123,300	5,550	128,850	128,850
Dist. 3	400,000	22,200	422,200	422,200
Dist. 4	220,000	5,200	225,200	225,200
Dist. 5	42,000	250	42,250	42,250
Dist. 6	105,000	4,600	109,600	109,600
East Texas field	205,000		205,000	205,000
Dist. 7-B	125,000	25	125,025	125,025
Dist. 7-C	170,000	4,500	174,500	174,500
Dist. 8	814,000	1,800	815,800	815,800
Dist. 9	179,000	150	179,150	179,150
Dist. 10	83,500	25	83,525	83,525
Utah	3,800		3,800	3,800
Wyoming	244,600		244,600	247,500
North Dakota	‡13,800		‡13,800	‡14,100
Total U. S.	6,054,500	88,350	**6,142,850**	6,164,050
Change from previous week, down			**21,200**	
Canada	†313,625		†313,625	†312,775

Total U. S. production January 1-August 28 ..... 1,530,301,000 bbl.
Same period last year (crude plus cond.) ..... *1,567,965,773 bbl.

*Includes 21,838,350 bbl. condensate. †Week ended previous Monday. ‡Includes S. D. 100 bbl.

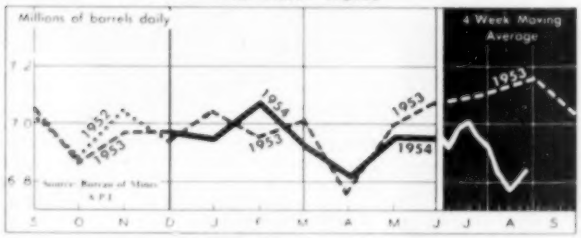
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

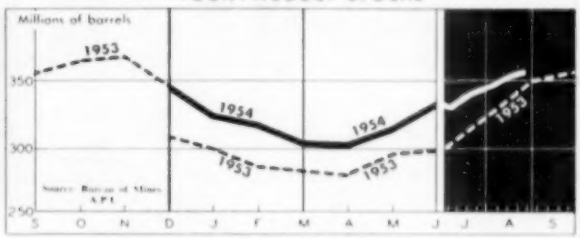
	Aug. 21, '54	Aug. 14, '54	Aug. 22, '53
Pennsylvania Grade	3,122	3,106	2,716
Other Appalachian	1,629	1,743	2,326
Illinois, Indiana, Michigan	11,938	12,379	12,539
Kansas	9,906	9,704	9,880
Oklahoma	27,047	25,994	29,518
Arkansas	3,215	3,184	2,825
Louisiana	16,813	16,829	16,748
North	2,590	2,668	2,885
Gulf	14,223	14,161	13,863
Mississippi	2,784	3,071	3,581
New Mexico	8,595	8,749	9,231
Texas	131,445	132,097	132,916
East Texas proper	11,369	11,618	11,578
West Texas	57,557	57,942	58,469
Texas Gulf	26,700	27,653	28,605
Other Texas	35,819	34,884	34,264
Wyoming	13,128	13,497	14,032
Other Rocky Mountain	5,116	5,175	3,052
California	32,783	33,464	33,376
Foreign	†10,267	10,832	10,018
Total	277,788	279,824	282,758

*Bureau of Mines. †Includes 2,565,000 bbl. in California.

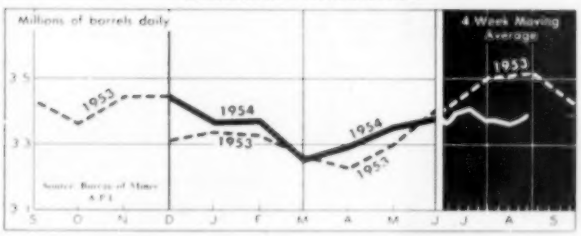
REFINERY RUNS



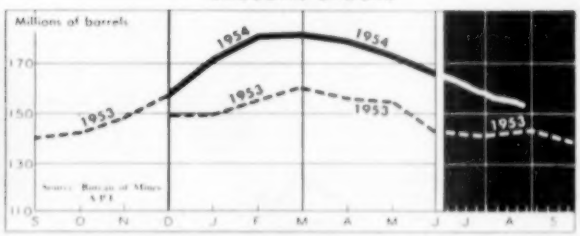
FOUR-PRODUCT STOCKS



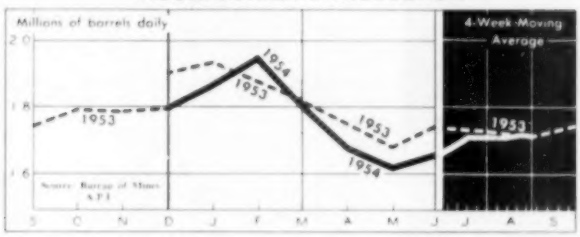
GASOLINE PRODUCTION



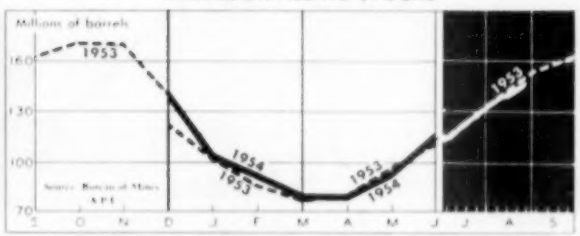
GASOLINE STOCKS



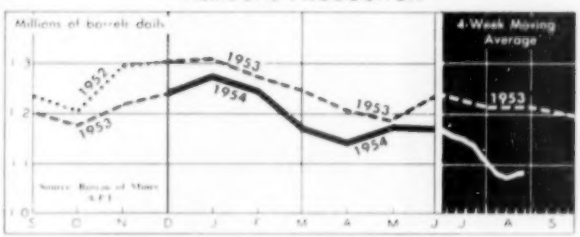
MIDDLE-DISTILLATE PRODUCTION



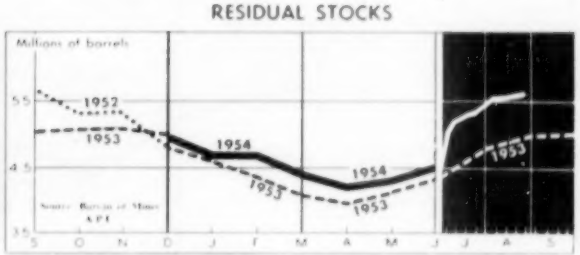
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, AUGUST 27

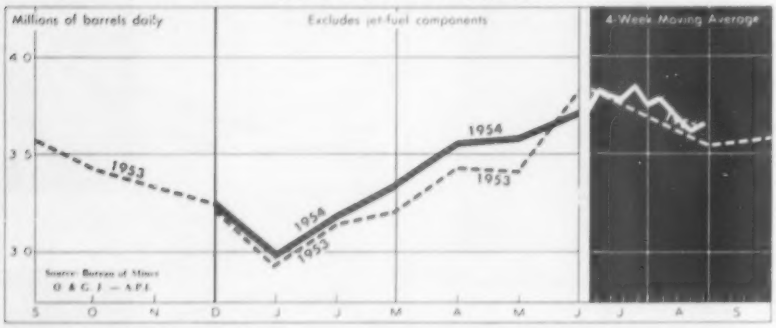
(Excludes all jet-fuel components)

(Thousands of barrels)

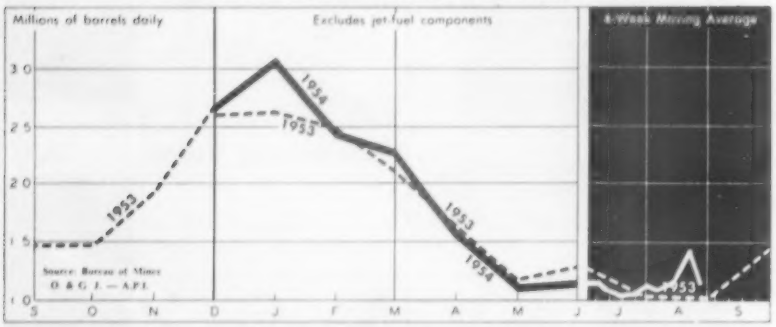
District—	Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.	Stocks‡—Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1953—Daily avg. runs	Daily average production—Gaso.*	Kero.	Dist.	Resid.
East Coast	1,088	447.8	27.7	265.7	219.0	33,863	13,677	38,928	11,515	1,073	438.7	34.2	251.7	227.4
Appalachian:														
District 1	108	45.3	5.6	25.6	11.4	4,157	558	1,818	463	99	42.1	3.9	18.6	10.6
District 2	66	33.6	0.6	11.9	6.0	2,402	456	749	325	93	52.9	6.7	9.8	11.8
Ind., Ill., Ky.	1,195	652.3	69.8	219.6	141.1	35,751	8,853	23,855	4,685	1,351	740.9	79.4	231.3	168.2
Okla., Kans., Mo.	596	349.0	13.6	132.6	36.0	15,531	2,110	12,151	1,170	642	361.9	21.5	144.4	47.5
Inland Texas	244	169.4	6.3	46.3	20.6	5,484	411	2,259	1,304	266	188.4	8.8	43.1	34.0
Texas Gulf Coast	1,704	804.3	105.7	370.9	224.6	18,998	3,779	13,019	6,119	1,658	828.8	111.5	374.4	240.2
La. Gulf Coast	598	277.1	57.7	152.1	33.4	8,103	2,649	5,154	1,351	551	290.2	40.5	136.4	52.0
N. La. and Ark.	89	33.4	7.4	20.1	5.7	4,057	1,073	1,290	124	86	33.3	6.3	19.9	4.8
Rocky Mountain:														
New Mexico	19	12.1	0.9	3.0	2.9	249		82	34	21	12.7	0.5	3.5	3.1
Other Rocky Mtn.	227	109.1	4.8	49.0	36.0	6,500	291	2,569	917	260	123.1	3.0	53.5	40.5
California	1,021	447.6		147.1	348.3	18,662	373	13,110	27,896	1,063	478.5	4.3	150.1	382.3
Aug. 27, 1954	6,955	3,381.0	300.1	1,443.9	1,085.0	153,757	34,260	114,984	55,903	7,163	3,591.5	320.6	1,436.7	1,222.4
Aug. 20, 1954	6,936	3,403.7	310.1	1,465.9	1,131.0	155,017	33,830	111,444	55,848					
Aug. 28, 1953	7,234	3,475.7	296.6	1,473.9	1,175.1	141,475	34,145	116,710	50,912					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

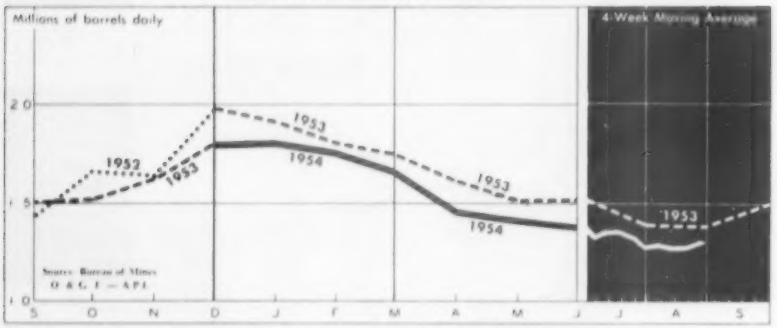
TOTAL GASOLINE DEMAND


Millions of barrels daily
Excludes jet-fuel components
4-Week Moving Average
1953
1954
Source: Bureau of Mines
O & G J — API
S O N D J F M A M J J A S

TOTAL MIDDLE-DISTILLATE DEMAND


Millions of barrels daily
Excludes jet-fuel components
4-Week Moving Average
1953
1954
Source: Bureau of Mines
O & G J — API
S O N D J F M A M J J A S

TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of September 1, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.5-11	11.25-12	10.50-10.75
Premium gasoline	11.5-12.0	13-13.75	11.50-11.75
42-44 w.w. kerosine	9-9.25	9.70-9.95	8.75-9
No. 2 straw fuel oil	8.25-8.5	8.95-9.2	8.25-8.5
No. 6 residual	$1.15-1.20	$2.10-2.25	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.0	4.5	4.75
Grade 18-55	6.0	5.5	5.75

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX

Mid-Continent

132-134 A.M.P.	6.0

• Grade 26-70 natural gasoline moved up 0.5 cent a gallon on August 30, following a period of split postings in the latter part of the previous week. Crude prices were adjusted in some Pennsylvania Grade areas, effective September 1.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 8-27-54	3,386	3,676
June 1954	3,379	3,894
July 1953	3,501	3,690
August 1953	3,517	3,544
Middle distillate:		
Four weeks ended 8-27-54	1,722	1,123
June 1954	1,705	1,159
July 1953	1,735	1,035
August 1953	1,724	1,031
Residual fuel:		
Four weeks ended 8-27-54	1,093	1,325
June 1954	1,123	1,349
July 1953	1,224	1,390
August 1953	1,222	1,411

CRUDE PRICES GRAVITY SCHEDULE

	Signal Hill, Calif.*	Okla-homa, Kansas	Gulf Coast Tex.†	West Tex.‡
14-14.9	$1.87			
15-15.9	1.93			
16-16.9	1.99			
17-17.9	2.05			
18-18.9	2.11			
19-19.9	2.18			
20-20.9	2.24	$2.50		$2.37
21-21.9	2.30	2.52		2.39
22-22.9	2.37	2.54		2.41
23-23.9	2.45	2.56		2.43
24-24.9	2.53	2.58	$2.91	2.45
25-25.9	2.61	2.60	2.93	2.47
26-26.9	2.69	2.62	2.95	2.49
27-27.9	2.76	2.64	2.97	2.51
28-28.9	2.83	2.66	2.99	2.53
29-29.9	2.91	2.68	3.01	2.55
30-30.9	2.97	2.70	3.03	2.57
31-31.9	3.04	2.72	3.05	2.59
32-32.9	3.12	2.74	3.07	2.61
33-33.9		2.76	3.09	2.63
34-34.9		2.78	3.11	2.65
35-35.9		2.80	3.13	2.67
36-36.9		2.82	3.15	2.69
37-37.9		2.84	3.17	2.71
38-38.9		2.86	3.19	2.73
39-39.9		2.88	3.21	2.75
40 and above		2.90	3.23	2.77

*Standard Oil Co. of California. †Upper Texas Gulf Coast. ‡Includes New Mexico Permian.

Effective dates: California, February 16, 1953; east of California, June 15, 1953; Pennsylvania Grade, September 1, 1954.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

Louisiana:	
Cotton Valley (distillate)	$3.00
Cotton Valley (Holloway crude)	2.95
Texas:	
East Texas	2.90
Chapel Hill	2.83
Conroe	3.13
Van	2.73
Pennsylvania Grade:	
Bradford	3.00-3.23
Middle District	3.15
Southwest Pennsylvania	2.81
West Virginia	2.70
Ohio	2.74
Illinois Basin	2.90-3.02

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LOADING RACK FOR SALE. 1—10 car steel walkway for loading rack, knocked down, good as new condition. Also one 9000 barrel steel riveted storage tank, erected, in good condition, suitable for re-erection. If interested in above, can make very attractive price on same. OIL FIELD SALVAGE COMPANY, Breckenridge, Texas.

FOR SALE—At Oklahoma City warehouse, 10,000' New Republic 6⅝" OD 14.97#, electric weld line pipe, 30° beveled end, DPL, Grade "B". All or any part, $1.275 Ft. Cities Service Oil Company. Patridge, Bartlesville, Oklahoma.

GASOLENE PLANT
FOR SALE

Our Arkansas City, Kansas, Gasolene Plant is available for purchase and removal by January 1, 1955. Inventory and price upon request.

Cities Service Oil Company
PATRIDGE, BARTLESVILLE, OKLAHOMA

RECONDITIONED PIPE

77,500 feet
8⅝" O.D. 28.55 lbs. per foot

16,000 feet
12¾" O.D. 49.56 lbs. per foot

Machine cleaned—Beveled ends
20 foot random lengths

Large Diameter
NEW STEEL PIPE

16" O.D.	.250 wall	2500 feet
24" O.D.	.281 wall	4500 feet
26" O.D.	.281 wall	2400 feet

All 40 foot lengths

Ideal for Oil, irrigation, water, gas and structural purposes.

Complete inventories of new and used steel pipe in all diameters from ½" through 30".

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Kansas City 18, Kansas
ATwater 9305

FOR SALE EQUIPMENT

WELL DRILLING EQUIPMENT. New and used spudders, rotaries, core drills. Tools, pipe, cable. Everything for well drilling. Fishing tools rented. Pressey & Son, Pueblo, Colo.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

WILSON ATLAS. Sales Price—$21,000.00. Equipped with two L1-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell, Houston.

FOR SALE: Model "K" Cardwell tubing and rod unit complete with tubing and rod tools, mast, mounted on Ford tandem truck. Melco Drilling Company, Seminole, Oklahoma.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.
H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

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INGERSOLL-RAND
GAS ENGINE DRIVEN COMPRESSORS

1—	XVG-8	—350 H.P.
1—	XVG-6	—250 H.P.
1—	XVG-4	—150 H.P.

ANY COMBINATION COMPRESSOR CYLINDERS. SPECIFY INLET AND DISCHARGE PRESSURES. PROMPT DELIVERIES.

EARL E. KNOX COMPANY
TELEPHONE: 2-5204
BACON STREET, ERIE, PA.

FOR SALE EQUIPMENT

250 KW Westinghouse Electric Generator Set, powered by 300 hp Sterling Natural gas engine, direct connected, 440 V, 3 ph, 60 cy, AC, excellent condition. Mounted unit steel base, price $5000. W. A. Caplis, Box 1312 Shreveport, La. Ph. 2-5312 nights.

WILSON GIANT—Serial No. 6383. Sales Price—$6,000. Equipped with Two Waukesha 145 GK Engines in good condition. General Appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg - McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others — Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive. Location of Unit—Lake Charles, Louisiana. Contact Cardwell, Houston.

26" PIPE: 85# 5/16 Wall 1200' $2.00 per ft. Acme Iron & Metal Co. Box 84, Great Bend, Kansas. Ph. 7852.

THREE #12 Sweetland Filters, 48 bronze leaves, monel covered, on 3" C.C., now located in southwest, available for inspection. 11 Sperry 18" x 18" cast iron Filter presses, 11 chambers. Consolidated Products Co. Inc. #65 Garden Street, Hoboken, N. J. N. Y. Tel.: BArclay 7-0600.

ONE PORTABLE RIG, capable of 1000 foot with 4½ inch drill pipe. Powered with D318 Caterpillar, 2400 hours actual. Approximately 800 foot 4½ inch drill pipe. 41 foot hydraulic lift derrick. Tandem truck with winch, IHC water truck. C. H. W. Drilling Co., Elkhart, Kansas.

GASOLINE PLANT
FOR SALE

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

FOR SALE
EMSCO GB 800 RIG

This rig fully equipped with many extras. Less than 45,000' of hole drilled with rig and accessories since new. Inventory includes grooved drum, dynamatic brake, heavy duty mast, 12 foot substructure, 2 pumps including Gardner-Denver 800 H.P. GXR, 3 LRDU Waukesha Diesel Engines, Steel Mud Tanks, 4½" Grade E Hand Banded Drill Pipe, 6¼" and 7¾" Drill Collars. This rig is priced right. For details contact

BOX H-307, THE OIL AND GAS JOURNAL,
Tulsa, Oklahoma

FOR SALE EQUIPMENT

FOR SALE—Wichtex Model X5000 Spudder complete with tools and pipe. Contact Ekco Drilling Corp. Box 1167, Graham, Texas.

CARDWELL SPUDDERS—2-R.L. Models, complete with light plants, dog houses, wire lines, tools, swabs, tubing and rod tools. Both rigs have heavy 4-legged masts, and are covered with steel tops. Both have good G. K. motors. These rigs are in good shape and are ready to go. Box 593 or phone 496, Shawnee, Okla.

FRANKS MODEL 5000 Spudder — Serial No. 866. Sales Price—$7,500. Equipped with one Cummins HBI-600 Engine in good condition. Brake Rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment. Skid and 65' Double Leg Pipe Mast with 6⅝" and 7" Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines. Location of Unit — Western Kansas. Contact Cardwell, Wichita.

FOR SALE—TD-18 International Dozer with 13' blade. Good condition and ready to go. Located near Artesia, New Mexico. $5,000.00. Contact Malco Pipeline Company, Inc., Attention, F. E. Smith, Box 660, Roswell, New Mexico.

MODEL HL CARDWELL Three Drum Spudder, 65' Double leg mast reinforced for trunnion mount, heavy sub frame powered by model 145 GK Waukesha Engine with combination natural gasoline, butane fuel system and fireproofing equipment. Also equipped with Wire Lines, Dog House, Light Plant and Tools ready to operate. Excellent Condition. 36L Type EB Bucyrus rig, Late Type, equipped with 145 GK Waukesha Engine, Wire Lines, Dog House, Light Plant and Tools, ready to operate. These rigs can be seen working in West Texas. Contact by phone, Midland, Texas, 2-4743 or write Route 1, Box 47C.

FOR SALE: 96' Emsco Mast, 7½ x 12 G-D Pump with WAKU Waukesha, U-10 Unit Rig with (2) Gas Engines, 7¼ x 14 G-D Pump, Short Skids, 17½ FE Ideal Table, 54" Centers, Rebuilt Wilson "Giant" 2 engine rig drive, less engines, 5KW LeRoi Light Plant. For photos, detailed descriptions, prices, contact G. B. Pearson, J-S-G, Inc., 501 NE 26th, Okla. City. Jackson 5-6232.

PAIR SURPLUS 1070 Buda engines completely overhauled since use, each equipped with Twin Disc 27-inch hydraulic couplings. Engines located Wolf Trucking yard, Edmond, Okla. Price for pair, $7,000.00. Chester H. Westfall, Phone 4-3144, Tulsa.

FOR SALE

50,000' - 10¾" O.D., 40#, Bevelled for Welding, x 40' No. 1 Used Pipe.

Located Spiro, Texas

Attractively priced!

HORWITZ PIPE & STEEL COMPANY
Oklahoma City, Okla.
425 South Western CEntral 2-7391

100 TON LOCOMOTIVE DIESEL-ELECTRIC

1,000 Hp. American-General Electric

Very Good Condition

Manufacturers Equipment Co.
1070 E. 18th St. Cleveland, O.

USED EQUIPMENT

Model E Allis-Chalmers Skid Unit mounted on International Truck. Located Great Bend, Kansas.

Franks 7000 Single Drum Skid Swabbing Unit mounted on Dodge Tandem Truck. Located Odessa, Texas.

Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma.

O.C.S. Type 3 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Franks Super Senior Well Servicing unit 8 x 10 x 62 Single Pole Mast mounted on Tandem International Truck, Located Seminole, Oklahoma.

Write, wire or call Franks Mfg. Corporation, Box 3218, Whittier Station, Tulsa, Oklahoma.

FOR SALE EQUIPMENT

FOR SALE, Titan Wilson drilling rig, complete with drill pipe and derrick, price $75,000.00. R. P. Willis, Wichita Falls, Texas.

FOR SALE: ENGINE—165 Hp. Climax Model R61, maximum continuous Hp. rating 125. Herndon Drilling Company, 421 Mayo Building, Tulsa, Phone 4-9700.

FOR SALE—At Oklahoma City warehouse 2400' 10¾" 19.42# new Armco Spiral Weld Line Pipe, 7/32" wall, beveled 30°, in 50' lengths. Price $1.85 Ft. Cities Service Oil Company. Patridge, Bartlesville, Oklahoma.

FOR SALE: Sullivan 200 complete with all tools ready to work. Located Tulsa, Okla. Contact R. F. Mesker, Phone 6-0057 or 5-9357, Tulsa.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

EQUIPMENT WANTED

WANTED: 126' or 127' Lee C. Moore Mast, National "75" Drawworks with or without rig drive, 7¼ x 10 G-D Pump only, Model U-34 or equivalent single engine drawworks, complete string tools 4000' work, trailer mounted equipment preferred. Submit offers G. B. Pearson, J-S-G, Inc., 501 NE 26th, Okla. City. Jackson 5-6232.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal.

WANTED
Used API Bolted Steel Tanks
Contact—
NORMAN STRAUSS
Brown-Strauss Corporation
1546 Guinotte Avenue
KANSAS CITY, MISSOURI

HELP WANTED

EQUIPMENT WANTED

WE WANT TO BUY—1—4" stationary head for old style 4" Landis Machine. W. H. Greer Supply Co., Owensboro, Ky.

WILL PAY highest prices for used casing, used line pipe, abandoned leases, or other surplus lease equipment. Your idle producing equipment is worth dollars. Green Pipe & Supply Co., Box 1383, Tulsa, Oklahoma.

PODBIELNIAK "Hydrobot" low temperature distillation apparatus; photoelectric spectrophotometer, Beckman model DU preferred; Freas or Dispatch forced-draft oven; misc. lab equipment. Box 1546, Brownsville, Texas.

WANTED
Crude Oil Tank Bottoms and Unmarketable Low Gravity Crude
Contact—
RAY M. CODER
Chanute Refining Company
CHANUTE, KANSAS

HELP WANTED

WANTED: Distributor for Gas Lift Equipment in West Texas. Preferably Engineering or sales organization now operating in West Texas. Commission far above average. Macco Oil Tool Co. Inc., P. O. Box 7288, Houston 8, Texas.

DRAFTSMEN for Eastern Products Line. Experienced in Mapping, Piping. Permanent position for right men. Located near Allentown, Pennsylvania. Reply should include age, resume of experience, education, references and salary requirements. P. O. Box 68, Emmaus, Pennsylvania.

CHEMICAL ENGINEER—with 2-4 years technical experience in petroleum refinery operations. Position in research and engineering department of chemical company in midwest area. Work invloves petroleum refining and fuel manufacturing relationships. Box H-372, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMICAL ENGINEER WANTED
Houston Oil Refinery has opening for graduate Chemical Engineer with five or more years experience in the Petroleum Industry. Send complete resume to P. O. Box 5008, Harrisburg Station, Houston 12, Texas.

Oil Production Men

(Age: 25-39)

Desired by major oil company for career opportunities in South America.

PETROLEUM ENGINEERS

DRILLING ENGINEERS

Engineering Degree with 3 to 15 years experience in various phases of drilling, production and workover operations.

DRILLING SUPERVISORS

High school education or better, plus 5 to 15 years experience in drilling operations with at least 2 years as Tool Pusher.

PRODUCTION SUPERVISORS

High school education or better, plus 5 to 15 years experience in progressively responsible production work.

Salaries plus bonus $10,000-$15,000, depending on training and experience. Also liberal benefits, tax savings and home vacations with traveling expenses. Replies confidential.

Box 1540
Dept. Y-20
General Post Office
New York 1, New York

HELP WANTED

DRILLERS WANTED: Competent cable tool driller, for Bucyrus and Star drill machines. 6" wells from 160 to 250 ft. deep, plenty new pipe on hand, bits shop sharpened—experienced careful driller can make 550 to 650 ft. per month—at 75 cents ft. Gray Well Drilling Co., Delafield, Wis.

OBSERVERS to operate and maintain advanced type equipment. Field experience and good electronic background essential. Do not apply unless fully qualified. P. O. Box 13148, Houston, Texas.

ACCOUNTANT for Independent Rocky Mountain operator, experienced in oil development, production, transportation and income tax. CPA preferred. Give full details of personal history, education, experience and earnings in initial reply. All replies confidential. Box H-377, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOGRAPH PARTY CHIEF for small aggressive company. Minimum five years experience. Send transcript of college credits and brief outlining experience. Opportunities unlimited. Replies confidential. Box H-365, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT. List of oil companies and drilling contractors showing where to apply for foreign jobs. OIML Co., Box 2603, Tulsa, Okla. $5.00 cash.

WANTED FOR EMPLOYMENT
Petroleum Engineer, preferably recent graduate for Louisiana Gulf Coast work. Duties to require assistance in preparation of reservoir studies, evaluation and routine engineering reports. Work located in New Orleans with reliable and financially strong concern. Reply giving age, previous experience, if any, military status, and salary desired. Inquiries will be kept strictly confidential. Our employees know of this ad. Box H-381, The Oil and Gas Journal, Tulsa, Oklahoma.

DUE TO EXPANSION program large independent oil company has openings for assistants in seismic recording and computing. College graduates with at least one year of experience in geophysics desired. Ample opportunity for advancement. Give educational and previous employment details in initial letter and include photograph. All replies confidential. Box H-265, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED—Mathematical Analysis Group has openings for TWO mathematicians or physicists with advanced degrees and background in applied mathematics, numerical analysis and digital computing.

One position involves planning and supervision of numerical analysis and digital computing on reservoir engineering and petroleum production problems.

The other position involves mathematical analysis of refinery, pipe line, and exploration problems, including linear programming for optimum operations.

New laboratory building. Excellent benefits and working conditions. Address letter giving education, experience and salary requirement to Personnel Records Division, Continental Oil Company, Ponca City Oklahoma.

EXPERIENCED SALES MANAGER WANTED
to organize sales division for a new oil field and pipeline unit. Must have experience with specialty salesmen and supply house contacts. Age 28 to 40 and capable of earning $25,000 per year.
Box H-346, The Oil and Gas Journal, Tulsa, Oklahoma

WANTED
DRILLING ENGINEERS
PRODUCTION ENGINEERS

For foreign employment by established oil well drilling contractor. Candidates must be graduate engineers of wide technical and practical experience. Salary dependent upon experience and qualifications. Please write, giving full personal history and employment record. Please include telephone number. All applications will be considered confidential.

Box H-355, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

SOUTH AMERICA. Major Oil Company Our fee paid. Mechanical Engineer—Petroleum Engineer—Chemical Engineer—All requiring Degree, experienced or inexperienced. Geologist, single. Must have degree, some experience. Tool Pusher—under 40, three years' experience. Accountant—Degree, Accounting major, single. All information confidential. Contact CHAS. J. LOVELESS PERSONNEL SERVICE, 616 S. Main, Tulsa, Oklahoma. Phone 4-3193.

THE RIGHT MAN: Can you fill the position you have open from the qualifications listed in this column. Men are always looking for an opportunity to improve themselves. Use a "Help Wanted" Journal classified advertisement to find the men you need. See box heading for classified rates or write The Oil and Gas Journal.

SITUATIONS WANTED

ENGINEER, nine years varied drilling, work-over and oil and gas production experience in Rocky Mountains, desires change. Prefer responsible supervisory position. Box H-386, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM PRODUCTION ENGINEER —34; married; employed; seven years experience drilling, primary and secondary recovery operations. Desires responsible engineering position with producing company. Permian Basin, North Texas preferred. Box H-399, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTORNEY, married, age 35, five and one-half years with major producing company, Venezuela, desires responsible legal position in Latin American country. Experience in labor, tax, contracts, land, litigation, etc. Member Texas Bar six years. Box H-393, The Oil and Gas Journal, Tulsa, Oklahoma.

PIPELINE SUPERINTENDENT—B.S. Mechanical Engineering, B.S. Administration. Thorough experience in designing and installing automatic pump stations, piping layout, remote control equipment and operations. Thirteen years experience with major oil company. Under 40. Box H-348, The Oil and Gas Journal, Tulsa, Oklahoma.

BANKER - LAWYER - PRACTICAL Engineer. Fourteen years administration, six years corporate law, two years oil leasing and drilling. Have scientific bent and practical approach. Familiar with financing, accounting, taxes, credits, purchasing, machinery. 46 years old, robust, perfect health, family, can travel. Prefer independent oil producer but will consider manufacturer. Box H-392, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES MANAGER or other executive position wanted, with opportunity to purchase stock, in oilfield Sales and Service or Specialty firm. Now owner of similar small business, can transfer present accounts to new company on mutually profitable basis. Experienced, excellent background, extensive oil industry contacts. Only attractive proposition by reliable firm considered, preferably Houston or Gulf Coast location. Box H-395, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil Industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited. Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628, Hobbs, New Mexico,
Phone 3-3141.

146 Allen Building, Midland, Texas,
Phone 2-2962.

SITUATIONS WANTED

MINING GEOLOGIST—Ph.D., employed, would like to serve gas or oil company intending to enter the field of the rare and radioactive ores, either in a consulting capacity or full-time employment. References available. Box H-349, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN MATURE in years, experience and judgment wants connection with active organization, Houston area. Experienced oil field equipment management, oil marketing and various phases of industry. Valuable connections in these and allied lines. Direct inquiries to Box H-391, The Oil and Gas Journal, Tulsa, Oklahoma.

M.S. IN CHEMISTRY, 28, married, ambitious, 5½ years varied operating experience: Gasoline, Sulfur, Girbotol Plants. Research, Laboratory organization. Technical papers published. Presently holding responsible position. Desires relocation with opportunity for advancement. Box H-351, The Oil and Gas Journal, Tulsa, Oklahoma.

DRAFTSMAN, 3 years experience Seismograph Surveyor. References. Two years College. Desires permanent location. Box H-396, The Oil and Gas Journal, Tulsa, Oklahoma.

MAN MATURE in years with 25 years major oil companies experience. Capable and experienced in handling all phases of land department operations, past 5 years in administrative field. Valuable contacts established in Texas and Oklahoma. Desires connection with reliable Independent. Salary or Salary and interest. Box H-400, The Oil and Gas Journal, Tulsa, Oklahoma.

BEING DISCHARGED August, 1954. Marine Helicopter instructor, desires position flying helicopter, pipeline, executive, etc. Married, willing to travel. Complete resume on request. 3630 Topeka St., Corpus Christi, Texas. Phone 5-5877.

PIPELINE RIGHT-OF-WAY purchaser—10 years experience with major oil company now operating independently. Services available anywhere on daily or contract basis. John Gilbert, 2205 Baldwin, Houston 3, Texas. Phone Justin 4982.

ROTARY MAN: 27 years experience, 14 as drilling superintendent. Would like job, with or without working interest. Can go any place. Contact Box H-394, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST EXPERIENCED in Subsurface Exploratory Appraisals: Mapping and Sales work, desires to be associated or representative for a company in Tulsa. P. O. Box 1884, Tulsa.

CAN YOU USE
18 years oil field supply experience in field, office and executive positions with same company. 35 year old family man. Prefer independent or small company. Southwest. Contact Bernard Jones, 1820 Drakestone, Okla. City, Okla.

LAND RECORD MAN desires position with major oil company or independent. Box H-398, The Oil and Gas Journal, Tulsa, Oklahoma.

BUSINESS SERVICE

Delaware Corporations formed and serviced, American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

STRIP LOG CABINETS

MORE LOGS ARE FILED in Kraftbilt Strip Log Cabinets than all others combined! Loaded drawers glide smoothly on roller bearings. Three drawers to section—add sections as needed. Built to last a lifetime! Send for Catalog 352-B. Ross-Martin Co. P. O. Box 800-A, Tulsa 1, Okla.

REAL ESTATE

FISHING LODGE FOR SALE
Lake Bistineau—Bossier Parish, Louisiana
Cafe & Grocery Store Combined.
Large Summer Home.
10 Modern Cabins Furnished.
45 Plywood Rent Boats.
400' x 700' lot.
Rent Motors.
Boat House—30' x 80'.
3 Minnow Raising Ponds.
Deep Well Water.
All Modern Conveniences.
Excellent Fishing & Boating Spot.
G. C. GIBBS
P. O. Box 5164 **Bossier City, La.**

REAL ESTATE

REAL ESTATE

Available Office Space

Newly constructed, air conditioned fire-proof building with all modern conveniences, including ample parking space. Available about November 1, 1954.

Contact

GEM OIL COMPANY,
Box B, Brush, Colorado,
Tel.: 540

SOUTHERN CALIFORNIA HOME

For Sale: A fine home in Southern California, located in the City of Whittier, near Santa Fe Springs. Nine miles from Los Angeles. Custom built, finest construction throughout. French modern architecture. Ten rooms. Every modern convenience, including oval dining room, four bedrooms, playroom and beautiful tropical lanai. Spacious surroundings, barbecue, motor court, 3 car garage, semi tropical plantings. For brochure and further information address owner, 1237 N. Circle Drive, Whittier, California.

FOR SALE: Modern Air-Conditioned office building, suitable for medium size petroleum or allied firm. Equipment yard and garage with adequate parking facilities located in a desirable area of Tulsa. Box H-369, The Oil and Gas Journal, Tulsa, Oklahoma.

SPACE IS NEEDED: A Journal display classified advertisement is the quickest way to rent or sell your real estate. In the present period of expansion oil industry firms urgently need the space you have available. If it isn't listed here, you may also find it by stating your needs in these pages. For classified rates see box heading or write The Oil and Gas Journal.

MOUNTAIN RANCH

2800 acres deeded; 840 A. Taylor grazing lease; additional Forest permit for 150 cows. 240 acres irrigated hay land, cuts better than 400 tons hay a season. Madison River, outstanding fishing stream in entire U. S. runs through this ranch. Also hunter's paradise—bear and deer roam these acres. Has modern 4-bedroom home, 2 barns, cattle sheds, corrals. Fenced and cross fenced. (Cattle can be purchased at market price). Asking

$100,000

including all equipment, among it tractor, baler, etc.

WESTERN REALTY CO.
400 Livestock Exchange Bldg.
Denver 16, Colo.
Phone: KE 4-6313

LEASE AND DRILLING BLOCKS

YOU'LL GET shallow production on my structures near Cookeville, Tenn. 82 miles east of Nashville. The Knox dolomite and six other sands in the upper 1300 feet. N. M. Sauls, Cookeville, Tenn.

WILL BUY A ⅛ interest in a ⅞ drilling deal, either dry hole or turnkey, Texas, Okla., New Mex., La., Wyo., Kansas. No other states considered. Give full partic. No promoters. Box 22, Emmaus, Pa.

LOOKING FOR A LEASE? There will be over 40,000 wells drilled this year. If you are looking for a lease, drilling block, or drilling deal and you haven't found it in this column, or if you have a lease or drilling block you want drilled, a Journal classified advertisement can find an interested party. See box heading for classified rates, or write The Oil and Gas Journal.

LEASE AND DRILLING BLOCKS

Will pay cash instantly for lease (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

MAKE ME A DEAL TO DRILL section 31, Tnsp. 19, Block 20, Anderson Co., Kansas. 275 Acres, considerable Acreage bordering. C. W. Proctor, 3211 S. W. 9th, Des Moines, Iowa. Ph. 8-8156 or 4-7521.

FOR SALE: One-half of Landowners ⅛th. $2.50 per acre on approximately 2300 acres in Harrison County, Morefield Township, Ohio. Farms abstracted. Harry J. Iles, St. Clairsville, Ohio. Phone 730.

ABOUT 2000 ACRES in Braxton County and 1800 acres in Calhoun County, West Virginia. These leases are on the anticline and close production. Will assign them over to anybody for 1/16 carried of the oil and gas. Will sell 218 acres in Roane County; one well on it. Flows 100 barrels per day, makes ½ million cubic feet of gas per day. Will sell 5200 acres Eastern Ky. Price $3.00 per acre. M. Edward Hersman, P. O. Box 415, Spence, West Virginia.

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited
B. D. BUCKLEY
6835 Delmar Ave., St. Louis 5, Mo.

FOR SALE

8 producing wells in Logan County, Kentucky and additional acreage with excellent possibilities for further development. 1953 income $6,449.27.

Lamel Corporation
Marshall Building
Cleveland, Ohio
MAin 1-5555

WANTED

GEOLOGIST WANTS SET of old Oklahoma scout tickets. Primarily interested NE Oklahoma. Box H-380, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE SERVICE

OIL LEASING TROUBLESHOOTER. My specialty is getting those holdout leases, filling in tough spots in a block, getting difficult title requirements. Box H-385, The Oil and Gas Journal, Tulsa, Oklahoma.

MAP CABINETS

END MAP-FILING WORRIES FOREVER! Kraftbilt Rollfiles keep rolled maps safe from dust, dampness, pilferers. Used by all major and hundreds of smaller oil companies. Send for Catalog 352-B. Ross-Martin Co., P. O. Box 800-A, Tulsa, Okla.

ROYALTIES

WISH TO BUY producing royalties. Box H-379, The Oil and Gas Journal, Tulsa, Oklahoma.

JACK EAGLE, Oil Properties, 706 City Nat'l Bldg., Oklahoma City, Oklahoma. Telephone REgent 6-7027.

OFFERING CHOICE PRODUCING oil income royalties with large reserves per Dollar investments. A. S. Berry, 522 Wright Bldg. Tulsa, Okla.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates, or write The Oil and Gas Journal.

BUSINESS OPPORTUNITY

PRODUCER OF 60 profitable low cost motion pictures needs $140,000 to produce a popular adventure story full length in color. Money refunded from entire first returns plus 45% share. Tax ad. Low risk. W. P. Thomson, 465 Calif. St., San Francisco 4, EX 2-4050.

INVESTMENT GROUP has cash for producing properties, proven and semi-proven drilling deals. Submit full details. Box 46721, West Branch, 817 N. Hilldale Ave., Los Angeles 46, California.

WILL GIVE AWAY MY BUSINESS to qualified oilfield sales and specialty firm. Houston area, in return for overriding commission. Have good oil industry customers, lack sales personnel. Box H-397, The Oil and Gas Journal, Tulsa, Oklahoma.

Equipment Men

(Continued from page 181)

Sales Department Changes Announced by B. S. & B.

Floyd C. Myers, manager, Oilfield Sales, Black, Sivalls & Bryson, Inc., has announced the following personnel changes.

Sam Worrall has been appointed manager of the Salem, Ill., branch, succeeding Harrell Bruner. Frank Black has been assigned as branch manager at the Houston office. Jimmy Crume has been transferred from Salem to Carmi, Ill., as sub-branch manager and sales representative. Alvin Teal was recently named district engineer, Alice, Tex. Bud Bricmont has been transferred to Shreveport, La., as district engineer. John Humphrey has been transferred from Drumright, Okla. to Borger, Tex., as sales and service representative at that point. Jack Records has been appointed field salesman, working out of Ardmore in the Oklahoma City district. Wayne Robb has been appointed field salesman at Salem.

Worrall has been with B. S. & B. since May 1952, having previously worked for Mid-Continent Supply Co. He started at B. S. & B. as a sales trainee assigned to the Sidney, Neb., branch, and shortly thereafter, was moved to Carmi as sub-branch manager and sales representative.

Joining B. S. & B. in January 1954,

Black has spent all his time with the company in the Houston area as city sales engineer, branch manager, and special sales engineer.

Crume came to B. S. & B. in 1953, and has been in the capacity of a field salesman, working out of the Salem branch. Teal was formerly group leader and product development engineer in the oil field engineering department. He has been with B. S. & B. since 1946, and has been active in the department of heating and treating equipment.

Bricmont started his career with B. S. & B. in 1953 as a member of the engineering department. He later transferred to sales engineering, and from there to field engineer in the Oklahoma City district.

Humphrey has virtually worked for the firm all his working life; his father, J. E. (Dick) Humphrey having been manager at Seminole, Okla., for many years. Humphrey has been acting as field salesman at Drumright for the last several months.

Records, who has been assigned to the Duncan branch, came to work for the company just recently after having served his training period at Lafayette, La., where he was formerly employed by Grove Regulator Co.

Starting out in October 1951 as branch clerk at Salem, Robb worked there for nearly 3 years before reclassification to salesman trainee.

Oteco Names Taylor to West Texas Territory

B. G. TAYLOR

Appointment of Byron Glen Taylor as West Texas representative for Oteco Equipment Co. has been announced by O. W. Sanders, president.

Taylor, formerly of The National Supply Co., has spent the greater part of his career working in the oil fields of the West Texas area.

Oteco, home plant located in Houston, manufactures metal, rubber, and plastic oil-field specialty products.

ROCKY MOUNTAIN

(Continued from page 167)

of gas per day. The well produced through perforations 6,285-6,303 ft., in Morrison. The field was discovered in 1951 and El Paso acquired its holdings in the area during 1953. Both Entrada and Morrison have been proven productive on the block.

Casing Set at Washington County Apparent Discovery

New Drilling Co. has run casing to 5,128 ft. at 1 Blomenkamp, C NE NE 17-3s-56w, western Washington County. The operator recovered oil on drill-stem test of the J sand zone 5,003-08 ft. The interval was originally identified as D sand, but has now been established as an upper bench of J sand. Two benches of the formation have shown substantial saturated sections. Recovery in 1½-hour test of the zone mentioned was 3,180 ft. of oil. The well is about 3½ miles southeast of Badger Creek field.

WESTERN NEBRASKA

Kimball County Apparent Discovery Tested

Harper-Turner Oil Co. and Dunn & Boreing, both of Denver, have reported recovery of D sand oil at 1 Nelson, NW NW SW 14-13s-53w, Kimball County. The well made 475 ft. of oil and 530 ft. of fresh water on 90-minute test of the zone 5,587-97 ft. Flowing pressure was 300-500 psi. The operators have run casing. J sand was drilled without reported shows.

ADVERTISERS IN THIS ISSUE

Aerofin Corporation 28
Amercoat Corporation 10
American Cyanamid Company, Refinery Chemical Department 21
American Iron & Machine Works Co. 149
American Zinc Institute 46
Anderson-Dunham, Inc. 34
Anthony Company 149
Armco Drainage & Metal Products, Inc. 67
Atlas Exploration Company 181
Baird Mfg. Co. 129
Baker Oil Tools, Inc. 52
Beech Aircraft Corp. 12
Bethlehem Steel Co. 20
Black, Sivalls & Bryson, Inc. 15
Broderick & Bascom Rope Co. Back Cover
Brown & Root, Inc. 72
Bucyrus-Erie Co. 19
Burgess-Manning Company 48
Butler Manufacturing Co. 126
Cable Engineering 164
Carbide and Carbon Chemicals Company, A Division of Union Carbide and Carbon Corporation 26
Cast Iron Pipe Research Association 132
Chain Belt Co. 170
Charles Machine Works, The 129
Chicago Bridge & Iron Company Inside Front Cover
Classified Advertising 191, 192, 193, 194
Claymont Steel Products of Wickwire Spencer Steel Division of the Colorado Fuel and Iron Corporation 37
Columbus Hotel, The 132
Continental Supply Co., The 142, 143
Cowan & Associates, B. E. 168
Crane Co. 138
Crose Manufacturing Co., Inc., M. J. 50
Darling Valve and Mfg. Co. 148
Davison Chemical Company Division of W. R. Grace & Co. 8
Dean Brothers Pumps, Inc. 132
Dean Hill Pump Company 39
De Laval Steam Turbine Co. 44
Delta Engineering Sales Co. 131
Denison Engineering Company, The 79
Diamond Chain Company, Inc. 156
Dowell Incorporated 54
Drilling & Service, Inc. 169
Dunham Tanks 34
du Pont 3
Eastman Chemical Products, Inc. 24
Edward Valves, Inc. 128
Enardo Manufacturing Co. 171
Fairbanks, Morse & Co. 2
Fleet-Line Co. 135
Fluor Corporation, Ltd., The 47
Ford Motor Company 30
Fort Worth National Bank, The 178
Foxboro Company, The 14
France Packing Company 130
General American Transportation Corporation 69
Glitsch & Sons, Inc., Fritz W. 141
Globe Oil Tools Company 42
Grancell, I. H. 128
Grinnell Company, Inc. 7
Guiberson Corporation Inside Back Cover
Halliburton Oil Well Cementing Co. 13, 77
Harms Marine Service, Inc. 164
Harnischfeger Corp. 27
Helicoid Gage Division, American Chain & Cable Co. 40
Hercules Tool Co. 155
Huey & Co., B. E. 135
Hughes Tool Co. Front Cover
Humble Oil & Refining Co. 131
Inferno Co., The 129, 164
International Harvester Co. 80
International Nickel Company, Inc., The 120
Jones & Laughlin Steel Corporation Supply Division 16
Kaiser Steel Corporation 196
Kemp Mfg. Co., C. M. 18
Kidde & Company, Inc., Walter 115
Koehring Company 11
Lane-Wells Company 9
Linde Air Products Company, A Division of Union Carbide and Carbon Corp. 22
Magnet Cove Barium Corp. 175
Manning, Maxwell & Moore, Inc. 122
Marley Company, The 6
Mayo Hotel, The 134
Minneapolis-Moline 25
Mission Mfg. Company 176, 177
Murphy Diesel Company 35
National Airoil Burner Co., The 130
National Supply Co., The 41
Naugatuck Chemical Division of United States Rubber Company 36
Nicholson & Co., W. H. 38
Nordstrom Valve Division, Rockwell Manufacturing Company 29
Oil and Gas Journal, The 137, 150, 154, 168
Oil Well Supply Co. 4
Okadee Company 43
Orbit Valve Company 113
Paris Distributor, Inc., Henry H. 137
Parkersburg Rig & Reel Co. 116
Partlow Corp., The 165
Pedrick Tool & Machine Co. 118
Peerless Supply Co. Inc. 164
Penberthy Injector Co. 133, 145
Penrose, Inc., Neville G. 168
Ratigan, Inc., J. P. 164
Raybestos-Manhattan, Inc., Packing Div. 49
Reed Roller Bit Company 179, 180
Refinery Supply Co., The 118
Republic Steel Corporation 166
Reynolds Metals Company 23
Rolo Manufacturing Co. 167
Ross-Martin Co. 129
Rubber Teck, Inc. 163
Ryerson & Son, Inc., Joseph T. 144
Scott-Rice Company 131
Spang-Chalfant Division of The National Supply Co. 41
Steel Forgings, Inc. 135
Stratoflex Inc. 150
Tapecoat Company, The 134
Temprite Products Corporation 165
Thomas Flexible Coupling Co. 174
Thornhill-Craver Co. 173
Unit Rig & Equipment Co. 151
Union Carbide and Carbon Corporation, Carbide and Carbon Chemicals Company 26
The Linde Air Products Company 22
United States Rubber Company, Naugatuck Chemical Division 36
U. S. Steel Corp. Subsidiaries 4, 17
U. S. Steel Supply Division 17
Vickers Incorporated 31
Victor Products Corp. 131
Viking Pump Co. 38
Vogt Machine Co., Henry 32
Walworth Co. 5
Web Wilson Oil Tools 129
Welex Jet Services Inc. 146, 147
Well Equipment Mfg. Corp. 45
Wheatley Company, Charles 160, 161
Wilson Manufacturing Co., Inc. 32

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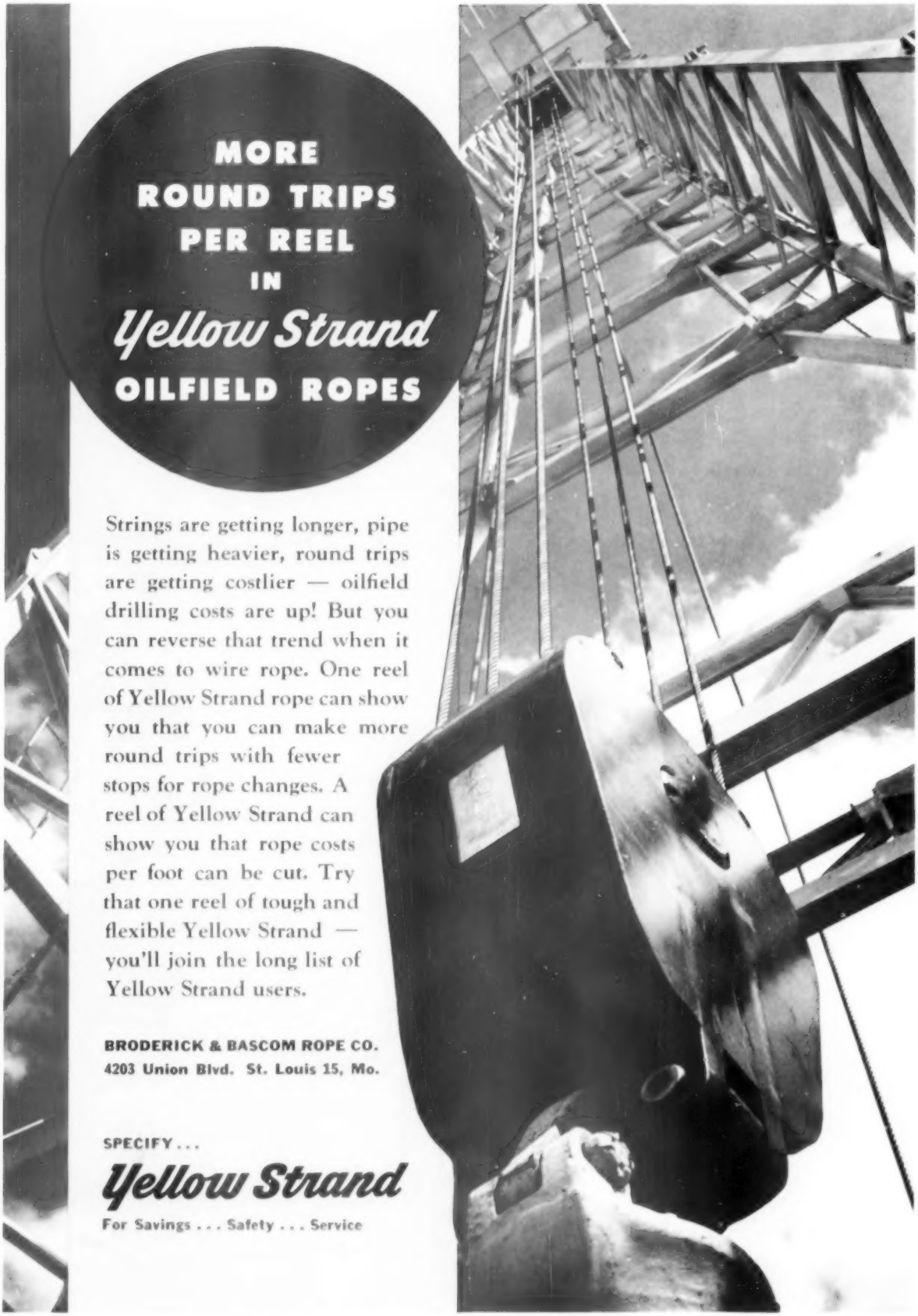

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